DL600E E1 Data Multiplexer User's Guide

Digital Link

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ISO Registration

Products Manufactured Under
An ISO 9001 Certified
Quality Management System

Regulatory Compliance Standards

To maintain EMC Class B (CE Label) compliance, shielded cables should be used with the unit.

The Digital Link DL600E module complies with

- CE MARK
- BABT NTR4
- Austel TS016
- Swedish SS636334
- German MÜ9a/b
- Australian AS 3260
- FCC part 15 Class A
- UL 1950 3rd Edition
- CAN/CSA C22.2. No. 950-95 3rd Edition

European harmonized standards:

- 73/23/EEC
- 91/31/EEC
- 89/336/EEC
- 93/68/EEC
- 91/263/EEC
- 2 Mbit/s G703 (E1) interface against UK specification NTR4 (75 ohm unbalanced)
- 2 Mbit/s G.703 (E1) interface against CTR12 (120 ohm balanced, unstructured) including protection test
- 2 Mbit/s G.703 (E1) interface against TBR13 (120 ohm balanced, structured) including protection tests.

CE 168 X

Under 89/336/EEC, as amended by 92/31/EEC and 93/68/EEC, the DL600E was tested in accordance with EN50081-1 (1995) and EN50082-1 (1994) to the following standards: EN55022 Level B, IEC 1000-4-2, ENV50140, ENV50141, IEC 1000-4-4, ENV50142, EN61000-4-8, and EN61000-4-11.

Under 73/23/EEC as amended by 93/68/EEC, the DL600E was tested to IEC 950 (1994) 3rd edition; EN 60950 (1992) 3rd edition. Under 91/263/EEC, this unit complies with the Pan-european requirements set forth in CTR 12 and TBR 13.

Under 91/263/EEC this product complies with the requirements of Annex III for Pan-European approval under CTR 12 and TBR 13 for 120 ohm operation. This information is contained in a report prepared by KTL. This report was submitted to BABT with a reference number: 1MST0400 and carries the BABT logo with the approval number: AA607035.

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Preface

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About this Manual

The *DL600E E1 Data Multiplexer User's Guide* provides information to install, configure, test, operate and manage the DL600 Encore E1 Data Service Unit.

Throughout this manual, "DL600E unit" is used to refer to the DL600 Encore E1 Data Service unit.

Audience

This guide is intended for experienced network managers and technicians who install LAN to WAN equipment. Users should be thoroughly familiar with the network topology in which the DL600E will operate.

Organization

This guide contains six chapters, two appendices, a glossary and an index.

Chapter 1, "About the DL600E Unit" provides a description of the DL600E unit and its features.

Chapter 2, "Installing the DL600E Unit" provides hardware requirements and instructions for installing the DL600E unit.

Chapter 3, "Configuring the DL600E Unit from a Terminal" shows how to configure the DL600E unit for a network environment.

Chapter 4, "Monitoring and Managing the DL600E Unit" provides instructions for managing and monitoring DL600E performance.

Chapter 5, "Using the Front Panel Interface" explains how to configure the DL600E unit from the Front Panel Interface.

Chapter 6, "Diagnosing the DL600E Unit" provides instructions for diagnosing and troubleshooting the DL600E Unit.

Appendix A, "DL600E Technical Specifications" provides basic data specifications, parameters, and the factory default configuration for the DL600E unit.

Appendix B, "DL600E Connector and Pin Assignments" provides network, channel 1, data port, comm port and adapter pin assignments for the DL600E unit.

Glossary, provides a glossary of terms used in this manual.

Index, provides an index of the manual.

Symbols

The following symbol means it is very important to follow instructions carefully:

Warning!

The following symbol means you must follow the instructions carefully to avoid possible risk of electrical shock:

Warning!

Typographic Conventions

The procedures in this guide are offset with horizontal lines and each step in a procedure is numbered. Single step procedures are not numbered.

This guide uses the following typographic conventions:

- Key words appear in boldface to draw your attention. For example:

  Type in the **password** and press **Return**.

  Δ **Note:** CTS (pin 8) **must** be connected between DL600E units, but it **must not** be connected to the terminal.

- Significant terms, when they appear for the first time also appear in boldface. For example:

  Special instructions for installing the DL600E unit with **DC power** are given at the end of this section.

- Names of menus, fields, and system prompts appear in italics. For example:

  In *Menu 8 Alarm II, Connection* is set to *Modem* and two different valid telephone numbers are entered in *Phone Number 1* and *Phone Number 2*.

- Two keys separated by a hyphen mean you hold down the first key while pressing the second key (unless indicated otherwise).

  Press **Ctrl-x** five times—means hold down the **Ctrl** key and press **x** five times.

Digital Link Technical Support

If you encounter a problem with the DL600E unit, prepare the following information and contact Digital Link Technical Support.

1. What is the software revision?
2. What is the hardware revision?
3. How is the unit configured?
4. When was the unit configuration last changed? How?
5. What is connected to the unit (routers, test equipment, and so on)?
6. What operation was in progress when the failure occurred?
7. What was the state of the LEDs on the front panel when the failure occurred?
8. What methods did you use in trying to resolve the problem?
9. Is the problem repeatable? If so, how?
10. Are the cables attached securely to the unit?
11. Are the cables shielded?
12. What is the unit's clock source?
13. Who can be contacted to discuss the problem?
14. What is the unit password(s)?
15. What information is on the configuration, error statistics and event history display screens at the time of the error? (Please provide a hard copy capture of the screens.)

Tech Support U.S.A.:	**(408) 745-4200**
Tech Support UK:	**+44 171 244-7660**
Company FAX:	**(408) 745-6250**
Email:	**support@dl.com**
Hours:	**24-hour service, 7 days a week**

Send Us Your Comments

We want to know if this manual meets your needs.

Help us improve our service by sending us your comments. Tell us what parts of the manual work for you, what parts do not, and what is missing.

You can send your comments and suggestions to:

- Digital Link Technical Publications facsimile: (408) 745-6250

  or
- Digital Link E-mail: techpubs@dl.com

When Returning a Unit

To return a unit for service or repair, call the Customer Service Deptartment at Digital Link first, ((408) 745-4200 in the U.S.A. or +44 171 244-7660 in the U.K) to obtain an **ERA number** (Equipment Return Authorization number).

Carefully package the unit with the ERA number on the address label and enclose a note describing the problem. Send it to the address below.

Customer Service Department
DIGITAL LINK CORPORATION
217 Humboldt Court
Sunnyvale, California 94089

1

About the DL600E Unit

- *Introducing the DL600E Unit 1-2*
- *DL600E Features 1-4*
- *About the Telnet Utility 1-5*
- *Applications 1-5*

Introducing the DL600E Unit

The DL600E unit is an intelligent E1 multiplexer and Data Service Unit (DSU). It is Data Terminal Equipment (DTE) that accesses public and private E1 and fractional E1 and Frame Relay services. The DL600E unit provides either two or four data ports for multiplexing (DTE) devices and an optional E1 Drop-and-Insert port. It converts V.35 and X.21 compatible DTE data for E1/FE1 network transport. It is ideally suited for point-to-point and multipoint E1 and FE1 connections of multiple data internetworking devices.

The front panel of the DL600E unit provides comprehensive LED status for each port and a 16-character fluorescent display with access to system configuration, performance statistics, and tests. It provides a full DSU interface with Telnet and Simple Network Management Protocol (SNMP) network management capability.

The DL600E unit has an extensive set of maintenance features to simplify network and equipment troubleshooting, including fixed and programmable test patterns (transmitted on the full E1 payload or the fraction of the payload associated with a user selected DTE port), network loopbacks, and DTE loopbacks for each DTE port.

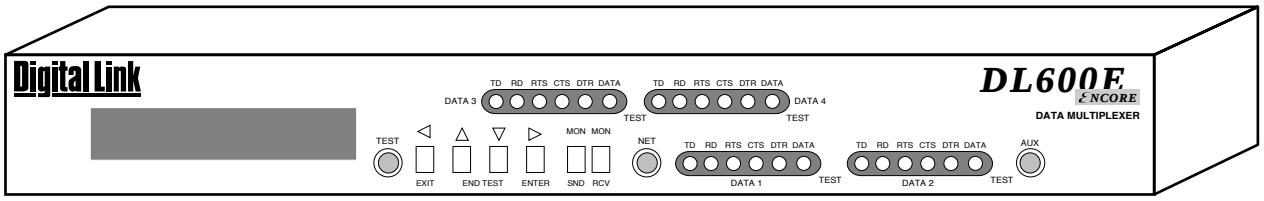


Figure 1-1 Front View of the DL600E Unit

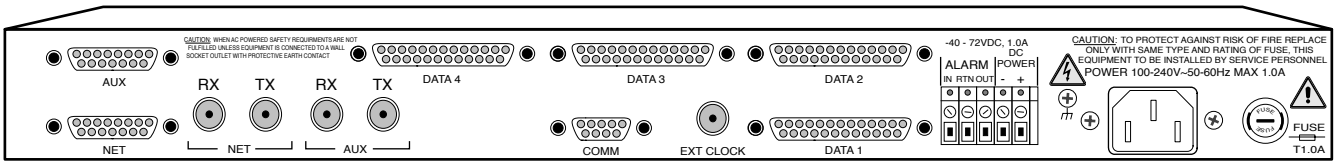


Figure 1-2 Back View of the DL600E Unit

DL600E Features

The DL600E unit offers the following service, access and management features:

Service Features

- E1/FE1 point-to-point connectivity
- Multiplex two or four DTE data sources to E1/FE1 network
- Access to cell and packet-based services such as Frame Relay and SMDS
- Drop-and-Insert port (optional)
- In-band communications with the remote unit
- In-band fractional loopbacks
- Integrated network interface
- Control and configuration through easy front panel operation, local or remote “smart” terminal, Telnet, or SNMP workstation using an embedded SNMP agent.
- HDB3 line encoding schemes
- Two or four data ports with:
  - Software selectable for V.35 or X.21 with DB25 connectors on the back
  - A DTE or DCE interface
  - Bandwidth mapping into contiguous or manually selected DS0 time slots
  - Selectable data rates for each DTE port: 64 Kbps to 1.984 Mbps
  - A smooth clock at all data rates
  - Timing options: SCTE clock, SCT clock, and inverted SCT

Access/Management Features

- Access for a terminal, Telnet connection, modem, or SNMP management station
- An embedded SNMP agent
- Support for SNMP RFC 1406 for E1, MIB II (RFC 1213) and Enterprise MIB
- Front panel LEDs
- Front panel display

- Performance monitoring and built-in test patterns and diagnostic tools to help maintain the line and troubleshoot problems on full or fractional E1 bandwidth
- Alarm reports sent to a terminal, printer or dialed-out
- Ability to download code upgrades
- Supports external alarms
- Co-located units can be daisy-chained to single communication point

Compliancy

Compliance with G.703 and G.704 specifications

About the Telnet Utility

Telnet is a TCP/IP-based network application or Internet service that enables you to log on to another node on the network and use the node's interface as though you were directly connected to the node. The Telnet application uses TCP as the transport protocol.

To log on a remote node using Telnet, enter the *telnet* command followed by the node's IP address or domain name or use an application that executes the command.

Applications

The DL600E unit can serve in a variety of applications using E1 or fractional E1 for Wide Area Network (WAN) connectivity.

The DL600E unit allows up to four internetworking devices, and optionally an E1 PBX, to be connected over a dedicated E1 facility.

The DL600E unit provides integrated access to a variety of network services. The fractional E1 compatible signal from the DL600E unit is directed by the Point-Of-Presence (POP) DACS to Fractional E1 network (for Video Conferencing, Channel Extension or Front End Processor traffic), to Frame Relay network (for router traffic), and (for PBX traffic) to the switched voice network.

2

Installing the DL600E Unit

- *Preparing for the Installation 2-2*
- *Installing the DL600E Unit Using AC Power 2-4*
- *Installing the DL600E Unit Using DC Power 2-5*
- *Connecting to a DTE Device and the Network 2-7*

Preparing for the Installation

This chapter describes how to install the DL600E unit.

Once you have installed the DL600E unit, go to *Chapter 3, "Configuring the DL600E Unit,"* for procedures explaining how to connect a terminal and configure the DL600E unit.

Before you begin the installation, you need to:

- Unpack and inspect the DL600E unit for damage that may have occurred during shipment.

  Wipe the exterior with a soft cloth, if necessary.

- Save all enclosed packing slips and documents. Keep the shipping cartons and packing materials until you have completed the installation and verified the unit's operation.
- **Fill out and mail the registration card in the manual.**

Warning! Voltages as high as 200VDC may exist at the telephone company's E1 interface in the form of simplex power. These voltages are hazardous and can cause death or severe injury!

Do not proceed with this installation if any voltage is present between the send and receive pairs of the network interface. Ask the serving telephone company to temporarily disconnect the simplex power during installation.

Checking the Equipment

Make sure you have the following equipment ready for the installation:

Comm port cable
RS-232 straight ribbon cable with DE9 plug connector on one end for connecting terminal, modem, SNMP workstation

or

DE9 to DB25 adaptors and null-modem adaptor

Multi-drop cable
DE9 connectors for connecting units in daisy chain

Data port interface cable
DTE or DCE type cable with DB25 plug connector on one end and V.35, RS-449, EIA-530 or X.21 connector on the other end

Network port interface cable
Cables with DA15 plug connector

or

Cables with DA15 plug connector on one end and BNC connector on the other end for coaxial interface

Coaxial cable for BNC connectors

The send and receive pairs of the E1 cable are shielded separately to minimize crosstalk

Power cord

AC power cord ordered from Digital Link for an AC model

or

Customer-supplied power cable (14 AWG, 3 conductors, copper-strand wire, type TC) for a DC model

Customer-supplied grounding cable
Cable used to connect DL600E unit to earth ground

Customer-supplied ANSI terminal

For configuring DL600E unit

Equipment Model Numbers

The Digital Link model numbers related to the DL600E unit are listed in Appendix A. Cable and connector pinout assignments are listed in Appendix B.

Gathering Information

To establish a Telnet connection to the DL600E unit, you must specify the DL600E **IP address** and **IP subnet mask**. To use an SNMP network management station, you must specify the DL600E **IP address** and **IP subnet mask** and one to three **NMS IP addresses.** You must do this from the terminal interface. Refer to *Chapter 3 Configuring the DL600E from a Terminal* for further information about the terminal interface.

Your network administrator should give you this information about the remote terminal before you begin the installation.

About the Power Supply

The DL600E unit can operate on either AC and DC power supplies. When the unit is ordered AC or DC must be specified.

- **AC power**—The DL600E unit can be powered from 100 to 240V AC, 50-60 Hz.
- **DC power**— The DL600E unit operates on -48VDC to -72VDC sources. The respective DC leads must **not** be crossed.

Instructions for both installing the DL600E unit for **AC power** and installing the DL600E unit for **DC power** are explained later in this chapter.

Installing the DL600E in a 19" or 23" Rack

The DL600E unit can be installed in either a 19" or 23" rack. The installation brackets are also reversible to fit a 23" rack.

Installing the DL600E Unit Using AC Power

Install the DL600E unit using AC power by inserting the AC power cable into the AC power receptacle on the rear panel of the DL600E unit as shown in Figure 2-1. Insert the other end into an AC outlet.

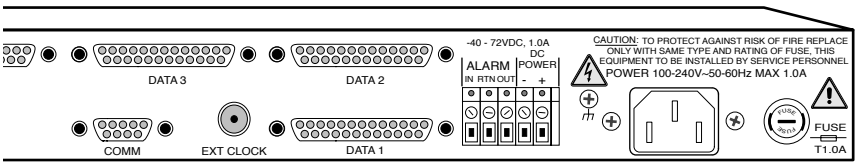


Figure 2-1 DL600E Rear Panel Showing Power Connections

The LEDs on the front panel flash as the DL600E unit automatically runs a *Self Test* at power up. The PWR/TEST LED blinks yellow and turns green when the test is successful. If the test fails, the LED turns red for ten seconds and then green.

Installing the DL600E Unit Using DC Power

Allow two to three feet of clearance around the DL600E unit to give you access during the installation.

Warning!

Take care when connecting to DC power. If you connect the DL600E unit improperly, you may damage it.

To Connect the DL600E Unit to DC Power

Use only a DC cable that is UL recognized 14 AWG, 3 conductors, copper strand wire, electrical power and control cable, type TC. An example is: 600 V, 90 degree C. Alpha Wire Company No. 45443.

Referring to Figure 2-1, use the following procedure:

---

1 Install the DL600E unit in the 19" rack.

2 Ground the DL600E unit to earth ground using a grounding cable connected to the ground stud on the back panel. The grounding cable is described in Appendix A.

3 Make sure the DC power source is **off**.

4 Before connecting the DL600E unit to the centralized **DC** power source, strip 2 inches (5.08 cm) of jacket material from the DC cable and 1/2 inch (1.25 cm) of insulation from the end of each wire.

5 Connect the -48V wire to the negative (-) terminal of the DL600E unit using a small flat screw driver to fasten the wire.

6 Connect the ground wire to the positive (+) terminal in the same way.

Δ The unit is designed to operate with *negative* voltage. Therefore, the **positive (+) terminal is connected to ground.**

7 Connect a third wire to the ground stud near the terminal block and to a good ground using a 1/4 inch (.635 cm) wrench and fastening torque of 5 lbs/ft. (.6 kg/ft.).

8 To minimize disturbance to the wires through casual contact, **secure** the DC cable to the rack frame using multiple cable ties. Use at least four cable ties, a minimum of 4 inches (10.16 cm.) apart. The first tie should be within 6 inches (15.24 cm.) of the terminal block. (A cable tie mount is provided.)

9 Turn on the DC power source.

The LEDs on the front panel flash as the DL600E unit automatically runs the *Self Test* at power up. The PWR/TEST LED blinks yellow and then turns green when the test is successful. If the test fails, the LED turns red for ten seconds and then green.

Connecting to a DTE Device and the Network

To connect the DL600E unit to a DTE device and to the network, refer to Figure 2-2 and use the following procedure:

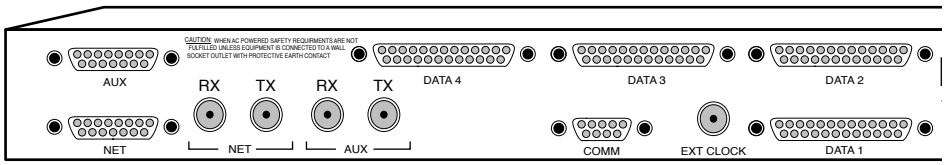


Figure 2-2 DL600E Rear Panel Showing Network Connections

---

1 Connect the data port interface cable to the DL600E DB25 socket connector (labeled DATA) and to the DTE device.

2 Connect the network port interface cable to the DL600E socket DA15 connector (labeled NET) and to the E1 cable.

or

Connect a BNC network port interface cable to the two DL600E BNC connectors (labeled RX and TX).

Warning! Do not connect a cable to the BNC connectors and the DA15 connector at the same time! It may damage the unit.

3

Configuring the DL600E Unit

- *Preparing to Configure 3-2*
- *Setting the Unit ID, Date and Time 3-10*
- *Configuring the E1 Network and AUX E1 Port Parameters 3-11*
- *Configuring the Data Port 3-16*
- *Allocating Timeslots 3-17*
- *Configuring for SNMP 3-21*
- *Configuring Two Levels of Access Rights 3-23*
- *Configuring Two Levels of Access Rights 3-23*
- *Configuring Alarm Conditions 3-24*

This chapter describes how to configure the DL600E unit using its terminal interface.

Δ **Note:** The DL600E unit can be partially configured from the front panel, which is the same as configuring from a terminal. Instructions for using the front panel to configure the DL600E unit is found in *Chapter 5, Using the Front Panel Interface*.

Preparing to Configure

During the initial DL600E configuration you must:

- Configure the Comm port from the front panel (if a terminal or SNMP manager is to monitor the unit)
- Set the DL600E IP address, IP subnet mask to establish a Telnet connection to the DL600E unit
- Set up to three Trap NMS IP addresses and community strings in *Menu-0 SNMP Config* to use an SNMP workstation

You must also perform the initial configuration of the unit ID and Comm Port from the front panel. The IP addresses and mask are configured from the terminal interface.

Keeping a Record

We suggest you keep a written record of each unit's configuration. Use the **Configuration Worksheet** provided at the end of Appendix A.

Connecting an ASCII Terminal

To use the terminal interface, you **must first** configure the Comm Port from the **front panel** of the DL600E unit. Refer to Chapter 5 for information on how to configure the DL600E unit with the front panel.

Connect a terminal to the DL600E Comm Port either directly, through a terminal server, or through a modem.

Before you connect the terminal, make sure the baud rate, parity bit, word length and stop bit settings on the terminal or modem **match** the DL600E settings.

Checking the Comm Port Settings

The default Comm Port settings are:

- Baud rate — 9600
- Parity bit — **None**
- Word length — 8
- Stop bits — 2

If the settings on the terminal or modem do not match those on the DL600E unit, change them

> Δ **Note**: You can also change the DL600E Comm Port settings. Refer to "The Comm Port Settings" in Chapter 5 for instructions.

Connecting the Terminal to the Comm Port

The Comm Port (DE9 connector), on the back panel of the DL600E unit, is compatible with ANSI based VT100-compatible terminals or terminal emulation programs supporting this format.

If the DL600E baud rate is 9600, the maximum distance between the terminal and the DL600E unit should be 50 feet (15.25 meters).

> Δ **Note:** A proprietary collision avoidance algorithm between the DSU using the CTS line enables communication with any DSU from a single Comm Port. Pin 8 (CTS) on the female connector should **not** be connected to Pin 8 on the male connector. If your cable is not supplied by Digital Link, be sure pin 8 is **not** connected at the terminal end of the connector. Refer to "Communication Port Pin Assignments" in Appendix B.

To connect a terminal to the DL600E Comm Port:

Using the 9-pin RS-232 straight-through ribbon cable (provided by Digital Link if ordered), plug the male 9-pin connector end into the DE9 connector, and the other end into the terminal's DE9 connector.

Refer to Figure 3-1.

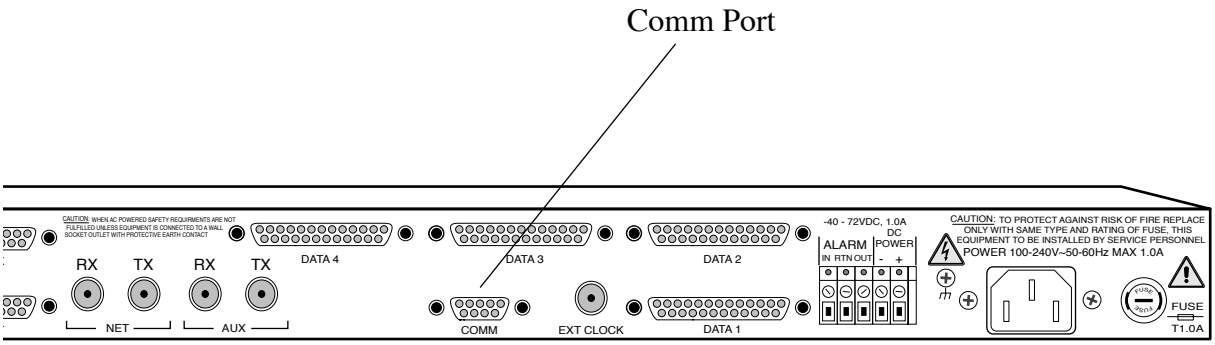


Figure 3-1 Comm Port on the Back Panel

Connecting a Terminal Through a Modem

To connect a terminal to the DL600E unit through a modem, use a null modem cable.

Δ **Note**: Digital Link can provide 9-pin to 25-pin adapters, or a null-modem adapter if required.

It is recommended, though not required, that *Connection* be set to *Modem* in *Menu-8 Alarm II*.

If the Comm Port baud rate is 9600, the distance between the DL600E unit and the modem cannot exceed 50 feet (15.25 meters). If the baud rate is less, the distance can be increased.

To connect a modem to the DL600E Comm Port:

---

1 Make sure the connection is a crossover (null) modem connection.

2 Make sure the DL600E baud rate, parity bit and stop bit settings match those of the modem.

If they do not, change the settings on the modem to match the DL600E unit.

3 Connect the modem to the DL600E DE9 connector shown in Figure 3-1.

4 Connect the modem to the phone line and the terminal.

Connecting DL600E Units in a Daisy Chain

You can daisy chain up to 60 DL600E units for centralized network monitoring and management.

Use an RS-232 ribbon-type cable with DE9 connectors (available from Digital Link).

Δ **Note:** CTS (pin 8) **must** be connected between DL600E units, but it **must not** be connected to the terminal.

If you are using a cable not provided by Digital Link, refer to Comm Port pin assignments in Appendix B.

To daisy-chain multiple systems together using a single RS-232 multidrop cable:

---

1 Using a ribbon cable with DE9 connectors, connect the cable's female DE9 connector to the terminal or modem (if at a remote site).

2 Connect the cable's male DE9 connectors to the Comm Port on each DL600E unit.

Logging on to the DL600E Terminal Interface

Use one of two methods to access the terminal interface:

- From a terminal connected (directly or through a modem) to the DL600E Comm Port
- From a remote terminal Telnet connection

User Access Rights

Two levels of access rights are available when you log on to the DL600E unit:

- Superuser access rights
- Normal User access rights

With the *Superuser* password, you can

- Log off a *Normal User* already logged on the DL600E unit
- Change both passwords
- Clear both passwords giving *Superuser* access to all users

With the *Normal User* password, you can:

- Log on only when no one is logged on
- Be logged off by a *Superuser*

The *Superuser* and *Normal User* passwords are set in *Menu-8 Alarms II*. Refer to "Configuring Two Levels of Access Rights" in Chapter 3.

The conditions for logging on differ when the DL600E terminal interface is free and when another user is already logged on. They are described in the following sections.

Logging on from a Terminal

To log on to the DL600 E unit, you need the DL600E ID. Press **Ctrl-x five times** to display all IDs of cards connected in a daisy-chain (a single RS-232 multidrop).

The default ID, a 6-character alphanumeric, is the DSU's portion of the serial number, for example: FE0086.

To log on to the DL600E unit when no other user is logged on:

---

1 Press **Ctrl-x,** type the unit ID and press **Return**.

2 If the unit is password protected and no other user is logged on, you are prompted:

Current Unit ID is MAUI.

Now you need a password to log in:

Type in the *Superuser* or *Normal User* **password** and press **Return**.

Menu-1 Main Status appears. (Refer to Chapter 4.)

If it does not, you may have an incorrect ID, a bad connection on the Comm Port or a bad Comm Port configuration.

Systems with blank IDs are always logged on and cannot be logged off until a unit ID is assigned.

Logging on in Other Conditions The system responds differently depending on the log on conditions on the DL600E unit.

System messages and user action	Condition on DL600E
Case A System: *Current Unit ID is MAUI.* *The Terminal User Interface is already in use. Enter the Superuser password to force the other user to log off or type <Ctrl-X> and try again later.* • Enter *Superuser* password to log off Normal User. • Enter *Superuser* password a second time when prompted to log on as Superuser or enter *Normal User* password to log on as Normal User. If you don't know the *Superuser* password, log off with Ctrl-x and try again later.	Normal User logged on using telnet.
Case B System: *The Superuser is already logged on. Try again later.*	Superuser logged on. You can't log on.

Δ **Note:** The system forces you off after a fifth unsuccessful attempt to log on.

Logging on Using a Telnet Connection

To log on to the DL600E unit user interface using a Telnet connection:

---

1 Enter the *telnet* command and the DL600E IP address.

Example of system response:

Current Unit ID is MAUI.

Now you need a password to log in:

2 Enter the *Normal User* or *Superuser* password.

The system logs you off after five unsuccessful attempts to log on.

Logging on in Other Conditions The system responds differently depending on the log on conditions on the DL600E unit.

System messages and user action	Condition on DL600E
Case A System: *Current Unit ID is MAUI.* *The Terminal User Interface is already in use. Enter the Superuser password to force the other user to log off or type <Ctrl-X> and try again later.* • Enter the *Superuser* password to log off the Normal User. System: `Password`: (example) • Enter the *Superuser* password a second time to log on as the Superuser or enter the *Normal User* password to log on as the Normal User. If you don't know the *Superuser* password log off with Ctrl-x and try again later.	Normal User logged on.
Case B System: *Current Unit ID is MAUI.* *The Superuser is already logged in to the Terminal User Interface. Please type <Ctrl-X> and try again later.*	Superuser logged on. You can't log on.

Logging off

To log off, press **Ctrl-x**.

You are logged off when the terminal stops responding to your keystrokes.

Before You Begin

To configure the local or remote DL600E unit, use the menus in the terminal interface or the SNMP network management program.

The following sections describe how to use the terminal interface.

Using the Terminal Interface

To use the terminal interface, you must first be in *Terminal Mode*. *Terminal Mode* is the default mode.

The terminal interface contains a number of menus for configuring, monitoring and managing the DL600E unit.

To select a menu, press the **menu number**, as indicated at the bottom of the screen.

To redraw a screen, press **Ctrl-L**.

Setting a Parameter in a Menu

Use the following method to select a parameter, set it and confirm your action:

- Move the cursor to the parameter field using the **Arrows** and press **Return** to put the field in edit mode (**highlighted** and **blinking**).
- Cycle through the available options using the **Up** and **Down Arrow**. Stop at the desired option and press **Return** to select it or, where appropriate, type the required value.
- Type **y** to confirm your action when prompted.

You can also use the **u** (up), **d** (down), **r** (right), and **l** (left) keys instead of the Arrow keys.

Overview of the Configuration

To configure the local or remote DL600E unit, set the following parameters:

- Date, Time and E1 network parameters in *Menu-4 Main Configuration*

- Parameters of the Data and AUX E1 ports in *Menu-5 Data Port Configuration*
- Timeslot allocations in *Menu-6 Timeslot Configuration*
- SNMP parameters in *Menu-0 SNMP Config* (if required)
- Alarm conditions, thresholds, and passwords in *Menu-7 Alarm I* and *Menu-8 Alarm II*

About the Remote System

The status and configuration of the remote system appear on the menu's right side if the remote and local systems have an In-Band Communication Link over a national bit. The local DL600E unit continuously polls the remote system for information and displays it on the screen. If the remote system stops responding for 30 seconds, its status and configuration do not appear on the menu; they reappear when the system responds.

Setting the Unit ID, Date and Time

Use *Menu-4 Main Configuration* to set the ID, date and time.

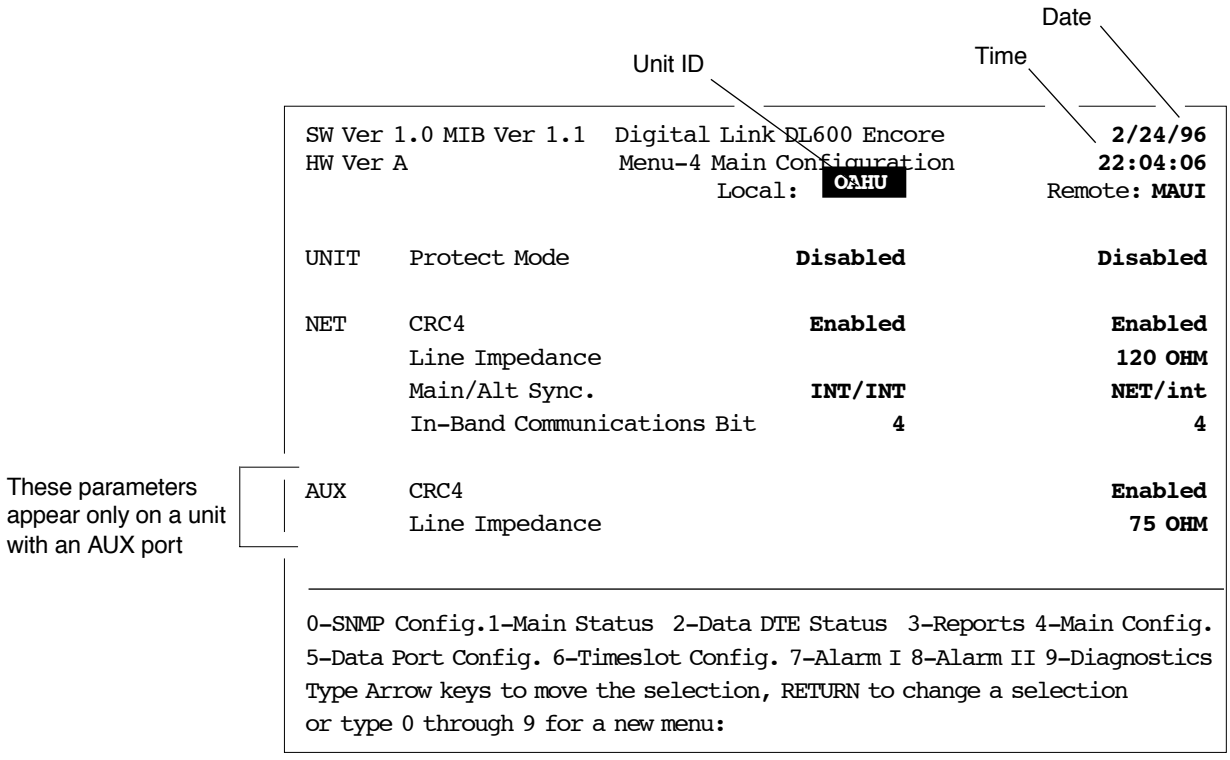

Date
Time
Unit ID
SW Ver 1.0 MIB Ver 1.1 Digital Link DL600 Encore 2/24/96
HW Ver A Menu-4 Main Configuration 22:04:06
Local: OAHU Remote: MAUI
UNIT Protect Mode Disabled Disabled
NET CRC4 Enabled Enabled
Line Impedance 120 OHM
Main/Alt Sync. INT/INT NET/int
In-Band Communications Bit 4 4
AUX CRC4 Enabled
Line Impedance 75 OHM
These parameters appear only on a unit with an AUX port
0-SNMP Config.1-Main Status 2-Data DTE Status 3-Reports 4-Main Config.
5-Data Port Config. 6-Timeslot Config. 7-Alarm I 8-Alarm II 9-Diagnostics
Type Arrow keys to move the selection, RETURN to change a selection
or type 0 through 9 for a new menu:

Figure 3-2 Menu-4 Main Configuration

Δ **Note**: The screen may contain parameters that apply only to the remote unit. In the example in Figure 3-2, the remote unit is a DL600E unit with an AUX port.

To set the date and time:

---

1 Move to the date or time field using the **Arrows** and press **Return** to select the field.

2 Enter the date or time as indicated by the prompt and press **Return**.

Example: 4/8/95 yields 4/08/95 and 22:6:7 yields 22:06:07 (The clock is a 24-hour clock.)

3 Type **y** to confirm after the prompt:

Do you really want to change the Configuration [Y/N]?

Configuring the E1 Network and AUX E1 Port Parameters

This section explains how to configure the following E1 network and AUX E1 port parameters for the DL600E unit. Refer to your service provider work order for framing and line code information.

To configure a parameter, select the parameter using the **Arrows** and press **Return** to put it in edit mode (**highlighted** and **blinking)**. Cycle through the available options using the **Up** or **Down Arrows**.

Set the following parameters for the local or remote DL600E unit:

UNIT

Protect Mode—Enabled or Disabled (Default—Disabled)

NET

CRC4 Bit (Cyclic Redundancy Check 4) —Enabled or Disabled (Default—Enabled)

Enabled—Enables the Cyclic Redundancy Check 4, a link-level error checking feature. A CRC calculation is performed and four frame bits are used to store it over the content of the frame. The CRC calculation is performed again when the frame is received

and the CRC values are compared. If they do not match, the frame is considered bad and the CRC statistic is incremented.

Line Impedance—75 OHM (BNC) or 120 OHM (DA15) (Default—75 OHM)

Appears in *Menu-4* only when the remote unit is a DL600E unit. The *Line Impedance* can be 75 OHM—BNC unbalanced or 120 OHM—DB15 balanced.

Main/Alt Sync—INT, EXT[n], NET, and DATA [1] (DTE) (Default—NET/INT)

Select the E1 network transmitter's clock source. First specify the *Main* clock source, then the *Alternate*. (Each clock source has the same options.) Type **y** to confirm each action.

The DL600E unit always attempts to use the *Main* clock source. If it is not available (due to a missing signal from the source or a diagnostic test), it uses the *Alternate* source.

Select *NETWORK* if the network is the clock source. If it is not, select *INTERNAL* at one E1 end, and *NETWORK* at the other. Select *DATA* if the DTE is the clock source. If the DL600E unit is the DTE device, use a cable appropriate to your application. When neither the *Main* nor *Alternate* clock source is available, the DL600E unit uses *INTERNAL.*

During all full bandwidth pattern tests, the DL600E unit cannot use *NETWORK* timing. Typically, the remote unit is in network loopback during a test and the DL600E unit should not use *NETWORK* timing since the received network signal is the signal it is generating. In this case, *NETWORK* is overridden and *Alternate* (if available) or *INTERNAL* is used.

The clock currently in use appears on the screen in upper case letters. In the example in Figure 3-2, the local main and alternate clock in use is *INT* while the remote main clock is *NET* (the alternate clock, int, is not in use).

In-Band Communications Bit—4 to 8 (Default—4)

Select a national bit (from 4 to 8) in timeslot 0 for the in-band 4Kbps communications link with the remote unit. Digital Link proprietary messages are sent to the remote unit using this bit. G.704 recommends using bit 4. (The unused national bits are set to 1.) If this feature is disabled, all national bits are set to 1.

AUX and AUX E1 Port

The two AUX parameters appear if the DL600E unit has the E1 drop-and-insert port and/or when the remote unit is a DL600E unit with the E1 drop-and-drag insert option present. All other units make the parameter appear blank.

CRC4 — Enabled or Disabled (Default—Enabled)

Same as CRC4 on page 3-11.

Line Impedance — 120 OHM, 75 OHM

Same as 75/120 OHM on page 3-12.

Downloading New Software

To download new software or a new download utility, use the *DOWNLOAD UTILITY 0.1* menu, opened from *Menu-4 Main Configuration*. Each operation disrupts normal service and resets the system.

To download new software or update the download utility:

---

1 Insert the new software diskette in the drive.

2 From *Menu-4 Main Configuration*, type **f** (as instructed in the menu) to start the download session.

The system prompts:

If you proceed, service will be disrupted and the unit will be reset at the end. Proceed? [Y/N]:

Type **y** to proceed (or any other key to cancel).

The *DOWNLOAD UTILITY 0.1* menu appears.

```
                        DOWNLOAD  UTILITY  0.1

Operational  Software:              OK
Updated  Download  Utility:         OK
Factory  Download  Utility:         OK
Download  RAM  allocated:           OK

Type S for Operational Software Download or D for Download Utility Download
Type  any  key  to  terminate  this  activity).  [S/D]:
```

3 Type **s** to download the new DL600E software or **d** to download a new download utility. (Type any other key to cancel.)

The system prompts (if **s** or **d** is chosen):

Please start the XMODEM download.
Type CTRL-X to abort.

4 From the terminal, select XMODEM transmission and specify the filename of the new software on the diskette.

5 The system informs you of a successful or unsuccessful operation. In each case (including a cancelled operation), it prompts:

Please type Y to reset the unit. [Y]:

Type **y** to reset the unit.

The system prompts:

Please wait... Unit is being reset.

System Messages and Error Indicators

During the operation, integrity check results are indicated by *OK* or *BAD* in the *DOWNLOAD UTILITY* menu:

```
                          DOWNLOAD  UTILITY  0.1

Operational  Software:                OK
Updated  Download  Utility:           OK
Factory  Download  Utility:           OK
Download  RAM  allocated:             OK
```

In the case of the first three items, the operation has proceeded correctly even when "*BAD"* appears.

Operational Software—*BAD* indicates the DL600E operational software stored in the FLASH failed either its CRC check or unused FLASH was not set to the expected value.

Updated Download Utility—*BAD* indicates the DL600E download utility stored in the FLASH failed either its CRC check or unused FLASH was not set to the expected value.

Factory Download Utility—*BAD* indicates the DL600E factory-installed download utility stored in the FLASH failed either its CRC check or unused FLASH was not set to the expected value.

Download RAM Allocated—*BAD* indicates that the DL600E download utility resident in RAM is corrupted and a successful download operation is not possible.

If the download utility or the operational software fails, the following failure statement and a corresponding error message given in Table 2-1 appears:

The download operation failed.

Table 3-1 DL600E Software Download Errors

Type Error	Description*
	Zero
	Event Error, Task=xxx Sate/Event=xxx
	Corrupted Loader Code, size=xxx
	Corrupted Software Code, size=xxx, checksum=xxx
Loader	Load Received is the wrong load, expected=xxx, received=xxx
	Load Received has invalid embedded length
	Load Received is corrupted, size=xxx, checksum=xxx
Flash	Flash-ROM Not Supported, address=xxx
	Flash-ROM With Protected Sector, Flash
	Flash-ROM Failed To Erase, Flash
	Flash-ROM Failed To Erase, Flash
	Flash -ROM Failed To Program, Flash
Xmodem	XMODEM Abort Received, expected packet=xxx
	XMODEM Data Timeout, expected packet=xxx
	XMODEM Invalid Sequence, expected=xxx, received=xxx
	XMODEM Unexpected Data, expected packet=xxx, data received=xxx
	XMODEM Packet Timeout, expected packet
	XMODEM Packet Corrupted, expected packet
	XMODEM Failed to Acknowledge, packet

*xxx=DL600E supplied parameter.

Configuring the Data Port

To configure a data port, use *Menu-5 Data Port Configuration.*

Set the parameters for the local and remote units.

```
SW Ver 1.0    MIB Ver 1.1            Digital Link DL600 Encore          4/22/95
HW Ver A                    Menu-5 Data Port Configuration              2:43:58
                    Local:  OAHU                      Remote:  MAUI
        Loss   MODE   Format   Clock            Loss   MODE   Format     Clock
DATA1   NONE   DTE    X.21     SCTE             NONE   DTE    X.21         CTE
DATA2   NONE   DTE    X.21     SCTE
DATA3   NONE   DTE    X.21     SCTE
DATA4   NONE   DTE    X.21     SCTE

0-SNMP Config.  1-Main Status  2-Data DTE Status  3-Reports  4-Main Config.
5-Data Port Config.  6-Timeslot Config.  7-Alarm I  8-Alarm II  9-Diagnostics
Type Arrow keys to move the selection, RETURN to change a selection
or type 0 through 9 for a new menu:
```

Figure 3-3 Menu-5 Data Port Configuration

The example in Figure 3-3 shows the local DL600E unit with four data ports in use. The remote unit is a DL600E unit with one data port.

The Data Port parameters and their options are:

Loss—DTR (Data Terminal Ready), RTS (Request to Send) or NONE (Default—RTS)

Select the criteria for detecting loss of signal on the data port. The loss appears when detected by the DL600E unit.

MODE—DTE or DCE (Default—DCE)

Configure the data port as a DTE (Data Terminal Equipment) or a DCE (Data Circuit Equipment). Each requires a different cable.

When DCE, both SCT and SCR are derived from a single smooth clock source requiring the synchronization of the transmit and receive directions, each directions derived from the same timing source.

When DTE, the data port ignores the SCT signal and uses SCR to time both the send and receive signals.

Format—V.35 or X.21 (Default—V.35)

Select V.35 or X.21 operation. You can select *RS-449* and *EIA-530* by using different cables.

Clock—+SCT, -SCT, or SCTE (Default—+SCTE)

For DTE timing, select *SCT*, a unipolar clock generated by the DCE. You can invert the clock (-SCT) or not (+SCT).
Use *SCT* inversion (-SCT) and *SCTE* to correct delays in clocking due to cable length.

When the data port is a DCE, select any of the three options.

When he data port is a DTE, you must select *SCTE*.

Allocating Timeslots

The DL600E 1.984 Mbps data rate is divided into 31 DS0 timeslots with a default allocation of all 31 slots allocated to data port 1.

You must allocate timeslots for the local and remote unit in *Menu-6 Timeslot Configuration* according to your specific needs and requirements.

Allocate by Port—displays allocated timeslots for one data port at a time only.

Network Timeslot Map—displays the entire timeslot configuration.

The default factory allocation appears in *Allocate by Port* as follows:

```
DATA01 TS01-TS31 1984KB/S
```

Two Allocation Methods

Use one of two methods to allocate timeslots: *Contiguous* (default) or *Manual*. Select the allocation method in *Allocation Type*.

Contiguous—Allocates timeslots in a contiguous order.

Manual—Allocates timeslots in an arbitrary random order. This method decreases the likelihood of unauthorized access using in-line taps.

The example in Figure 3-4 shows the timeslots for the local DL600E single data port allocated in a random order. For the remote DL600E unit, slots 1 through 18 are allocated to data port 1 and slots 19 through 31 to data port 2.

```
SW Ver 1.0 MIB Ver 1.1          Digital Link DL600 Encore              04/22/95
HW Ver A                     Menu-6 Timeslot Configuration             12:56:56
                                    Local:  OAHU            Remote:  MAUI

              Allocation Type        Contiguous                  Contiguous
Allocate by Port:
                    DATA 01 TS01-TS31 1536Kb/s    DATA 01 TS01-TS18  1280Kb/s


Allocated by Timeslot:
                                  Network Timeslot Map
          1     2     3    4    5    6    7    8     9    10    11    12   13   14   15
Local    D01  D01   D01  D01  D01  D01  D01  D01   D01  D01   D01   D01  D01  D01
D01RemoteD01 D01   D01  D01  D01  D01  D01  D01   D01  D01   D01   D01  D01  D01  D01

         16   17    18   19   21   22   23   24    25   26    27    28   29   30   31
Local   D01  D01   D01  D01  D01 D01  D01  D01   D01  D01   D01   D01 D01  D01  D01
Remote  D01  D01   D01  D02  D02 L02  D02  D02   D02  D02   D02   D02 D02  D02  D02

0-SNMP Config   1-Main Status  2-Data   DTE Status   3-Reports    4-Main Config.
5-Data Port Config.  6-Timeslot Config.  7-Alarm I  8-Alarm II  9-Diagnostics
Type Arrow keys to move the selection, RETURN to change a selection
or type 0 through 9 for a new menu:
```

Figure 3-4 Menu-6 Timeslot Configuration

In the example in Figure 3-4, timeslots 1 through 14 are allocated to port 1 in a non-contiguous order. The remote unit as one of the following: a DL600E, Solo E1 standalone unit (DL085E), a DL600 unit, or a Solo E1 Ensemble Shelf plug-in module.

Allocating Contiguous Timeslots

You should be in *Menu-6 Timeslot Configuration* with the cursor in the first field, *Allocation Type*.

To allocate contiguous timeslots to a port, follow the method in the example below.

Example: To allocate contiguous timeslots 1 through 14 to Data Port 1 use the following steps:

---

1 To select *Contiguous f*or the allocation type.
- — Press **Return** to put *Allocation Type* in edit mode.
- — Cycle to *Contiguous*, using the **Up or Down Arrows**, press **Return** to select it and **y** to confirm your action.

2 To specify Data Port 1:

— Press the **Down Arrow** to move to *Allocate by Port* and **Return** to activate edit mode.

— Press **01** (for Data Port 01) and **Return**.

D01 appears in *Allocate by Port* and the start timeslot begins to blink. (You can specify only port 1.)

3 To specify the start timeslot and end timeslot:

— Press **1** and **Return** to specify start timeslot 1.

DATA01 TS01 appears; end timeslot field starts to blink.

— Press **14** and **Return** and **y** for timeslot 14.

— **DATA01 TS01-TS14 896 Kb/s** appears in the *Allocate by Port* field and timeslots 1 through 14 are allocated to port 1; all other slots are idle.

— Press **y** to confirm your action when prompted.

Refer to the example in Figure 3-4.

Allocating Timeslots Manually

To manually allocate timeslots to a specific data port, move to the timeslot and specify the port. You must set the other timeslots to *Idle*. Timeslots for the AUX E1 port can only be allocated manually.

Follow the procedure described in the example below.

Example: You want to allocate timeslots 3, 7, 9, 14, and 15 to data port 1. Your plan is to specify port 1 for these timeslots and for IDLE for all other timeslots.

---

1 To select *Manual*.

— Move to *Allocation Type* using the **Up** or **Down Arrows** and press **Return** to activate edit mode.

— Cycle through the options using the **Up** or **Down Arrows.**

— To select *Manual*, press **Return,** then press **y** to confirm.

2 To configure timeslot 1 as **IDLE**.

— Move to timeslot 1 using the **Down Arrows**.

— Press **Return** to activate edit mode.

The system prompts:

Type the UP or DOWN arrows to change the selection, or type a port number (NN or I for IDLE):

— Press **i** for *IDLE* and **Return**, then **y** to confirm.
— **_ _ _ _** A dashed blank line appears in timeslot 1.
— Press **L** and **y** for *Local* in response to the prompt:

Do you want to change the local unit, the remote unit, or both (L, R, or B)?

3 Use the same method to configure the other slots to *IDLE.*

4 To configure timeslots 3, 7, 9, 13 and 15 for Data Port 1.
— Move to the specific timeslot using the **Arrows** and press **Return** to activate edit mode.

You are prompted to:
— Type the **Up** or **Down** arrows to change the selection, or type a port number (NN or I for *IDLE):*
— Press 1 for data port 1, then **Return** and **y**.
DATA01 Fragmented 320 Kb/s ... is an example of the value in the *Allocate by Port* field.

Configuring for SNMP

Configure each unit for SNMP management functionality in *Menu-0 SNMP Config*.

In the example in Figure 3-5 the remote is a DL600E unit, a Solo E1 DSV unit, or a Solo E1 Ensemble Shelf Module.

```
SW Ver 1.0  MIB Ver 1.1   Digital Link DL600 Encore              4/22/95
HW Ver A                       Memu-0 SNMP Config.              12:56:56

                             Local:  OAHU                  Remote:  MAUI

UNIT    SNMP                    Disabled                        Disabled
        IP Address               0.0.0.0                         0.0.0.0
        IP Mask                  0.0.0.0                         0.0.0.0
        Forward Over IBC        Disabled                        Disabled

TRAP    1st NMS IP Address       0.0.0.0                         0.0.0.0
        2nd NMS IP Address       0.0.0.0                         0.0.0.0
        3rd NMS IP Address       0.0.0.0                         0.0.0.0
        Output Port                 COMM                            IBC

Community Strings
        Get                       public                          public
        Set                       public                          public
        Trap                      public                          public


0-SNMP Config.  1-Main Status   2-Data DTE Status   3-Reports  4-Main Config.
5-Data Port Config.  6-Timeslot Config.  7-Alarm I   8-Alarm II  9-Diagnostics
Type Arrow keys to move the selection, RETURN to change a selection
or type 0 through 9 for a new menu:
```

Figure 3-5 Menu-0 SNMP Config.

SNMP Parameters

Unit SNMP—Enabled or Disabled (Default—Disabled)

Enabled—Enables use of a SNMP management application.

IP address—nnn.nnn.nnn.nnn (Default—0.0.0.0)

nnn = 0 through 255

Enter the DL600E IP address. Example—192.84.33.6

IP Mask—nnn.nnn.nnn.nnn (Default—0.0.0.0)

nnn = 0 through 255

Enter the DL600E IP mask. Example—255.255.255.0

Forward Over IBC (In-Band Communication)—Enabled or Disabled (Default—Disabled)

Enabled—Enables the automatic forwarding of SNMP packets over In-Band Communication from the local DL600E unit to the remote unit.

TRAP 1st NMS IP Address—nnn.nnn.nnn.nnn (Default—0.0.0.0)

nnn = 0 through 255

Enter the IP address of the first Network Management Server. The DL600E unit sends trap messages to this server. You can specify up to three IP addresses of network management stations to which the DL600E unit sends traps.

TRAP 2nd NMS IP Address—nnn.nnn.nnn.nnn (Default—0.0.0.0)

nnn = 0 through 255

Enter the IP address of the second Network Management Server. The DL600E unit sends trap messages to this server.

TRAP 3rd NMS IP Address—nnn.nnn.nnn.nnn (Default— 0.0.0.0)

nnn = 0 through 255

Enter the IP address of the third Network Management Server. The DL600E unit sends trap messages to this server.

Δ **Note:** If all three TRAP NMS IP addresses are set, the DL600E unit sends a trap to all three network management servers.

Output Port—COMM (Default—COMM)

Select the DL600E NMS port to which traps are sent.

Community Strings

Get (text string) (Default — public)

Enter an alphanumeric text string (maximum—32 characters). The DL600E SNMP agent uses this text string to check *GET* requests for the SNMP configuration from the SNMP management station.

Set (text string) (Default — public)

Enter an alphanumeric text string (max—32 characters). The DL600E SNMP agent uses this text string to check *SET* requests from the SNMP management station to set the SNMP configuration.

Trap (text string) (Default — public)

Enter an alphanumeric text string (maximum—32 characters) which the DL600E SNMP agent inserts in SNMP TRAPs it sends to the SNMP management stations.

Configuring Two Levels of Access Rights

You can create two levels of access rights to the DL600E terminal interface: **Superuser access rights** and **Normal User access rights**.

Do this by entering unique *Superuser* and *Normal User* passwords in *Menu-8 Alarms II*.

Superuser Access Rights

The superuser can:

- Log off a *Normal User* already logged on
- Change both passwords
- Clear both passwords giving *Superuser* access to all users

Assigning User Passwords

It is important to **specify unique Superuser and Normal User passwords** in *Menu-8 Alarms II*.

Since two access methods to the DL600E unit can be used (a terminal connection or a *Telnet* connection) an unknown user could gain exclusive control to the DL600E unit if the *Superuser* and *Normal User* passwords do not have unique values.

No passwords set The first user that logs on in a "no passwords set" situation and sets one or both passwords gains exclusive control of the terminal interface.

One password only set If only one password is set, both passwords become the same. The first user logging on with the password has *Superuser* rights and can change both passwords gaining exclusive control of the terminal interface.

Configuring Alarm Conditions

Set alarm conditions in *Menu-7 Alarm I* and *Menu-8 Alarm II*.

They are based on the following events:

Table 4-1 DL600E Alarm Conditions

Alarm Source	Events
E1 Network port	Loss of Carrier, Loss of Sync, *(UA1)* Unframed All 1s Received, *(RAI)* Remote Alarm Indication Received, Code Violation Threshold Exceeded, *CRC* Error Threshold Exceeded.
Data Ports	Loss of signal
Other	Unit Test

How the DL600E Unit Reports Alarms

For an alarm to be detected and reported, the alarm must be set to *Enabled* and *Block all Alarms* set to *No*.

The local DL600E unit reports local alarm conditions to the device connected to its Comm Port (such as a terminal, printer or modem).

If the remote *Connection* in *Menu-8* is set to *In-Band Communications*, the local DL600E unit also reports the remote alarm conditions.

Depending on the network management environment, the DL600E unit may also send SNMP TRAP messages.

If the local DL600E unit is connected to a **modem** and an alarm occurs, the DL600E unit causes the modem to **dial out** (if in *Menu-8 Alarm II*, *Connection* is set to *Modem*; valid telephone numbers are set in *Phone Number 1* or *Phone Number 2*).

How Alarms Reports Are Displayed

Alarms are displayed **on a terminal** at the bottom of the screen when the terminal is connected to the Comm Port and you are logged on, for example, a carrier loss condition on the Data Port displays at the bottom of the screen as follows:

--Local ID*:Oahu Data1 Carrier Loss Start: 07:17:37 Jan.08, 1994--*

The alarm includes the unit ID, local or remote, type of alarm, start or end of alarm condition and date and time. It remains on the screen until a new alarm occurs or you select a new screen. When no alarm is present, a blank dotted line appears:

When you are not logged on, the alarm appears as a single line showing the unit ID, local or remote alarm, type of alarm, start or end of alarm and the time stamp.

Alarms are displayed the same way on a remote terminal connected by a **Telnet** connection.

In **SNMP mode**, the system sends the alarm as an SNMP TRAP to the SNMP manager which displays it on the SNMP console.

Configuring Alarms

To receive an alarm report, set the alarm to *Enabled* in *Menu-7 Alarm I* or *Menu-8 Alarm II*.

To set an alarm threshold, enter the threshold value in *Menu-7 Alarm I*. You can set the following three thresholds—*CV Threshold Alarm, CRC Threshold Alarm* and *FE Threshold Alarm*.

Block All Alarms must be set to *No* for enabled alarm conditions to be reported (default—*No*).

Figure 3-6 shows an example of *Menu-7 Alarm I*.

```
SW Ver 1.0   Mib Ver 1.1     Digital Link DL600 Encore       9/06/94
HW Ver A                          Menu-7 Alarm I            12:56:56
                                   Local:ALADIN           Remote:JAFAR

  Block All Alarms                        Yes                   No
   NET Carrier Loss Alarm               Enabled               Disabled
   NET Sync Loss Alarm                  Enabled               Disabled
   NET UA1 Received Alarm               Enabled               Disabled
   NET RAI Received Alarm               Enabled               Disabled
   AUX Carrier Loss Alarm                                     Disabled
   AUX Sync Loss Alarm                                        Disabled
   AUX UA1 Received Alarm                                     Disabled
   AUX RAI Received Alarm                                     Disabled
   DATA DTE Signal Loss Alarm           Enabled               Disabled
   CV Threshold Alarm                 5 x 10^-4               Disabled
   CRC Threshold Alarm                3 x 10^-4               Disabled
   FE Threshold Alarm                 7 x 10^-4               Disabled

0-SNMP Config.1-Main Status 2-Data DTE Status 3-Reports4-Main Config.
5-Data Port Config. 6-Timeslot Config. 7-Alarm I 8-Alarm II 9-Diagnostics
Type Arrow keys to move the selection, RETURN to change a selection
or type 0 through 9 for a new menu:
```

Figure 3-6 Menu-7 Alarm I

Figure 3-6, the remote unit is a DL600E unit, Solo E1 unit or A Solo E1 Ensemble Shelf Module.

Menu-7 Alarm I Parameters

Block All Alarms—Yes, No (Default—No)

Yes—Blocks the reporting of alarms.

No—Enables the DL600E unit to report alarms.

NET Carrier Loss Alarm—Enabled, Disabled (Default—Enabled)

Enabled—The DL600E unit generates an alarm when a *Network Carrier Loss of Signal* occurs.

Disabled—Disables the function.

NET Sync Loss Alarm—Enabled, Disabled (Default—Enabled)

Enabled—The DL600E unit generates an alarm when a *Network Sync Loss* occurs.

NET UA1 Received Alarm (Unframed All 1s)—Enabled, Disabled (Default—Enabled)

Enabled—The DL600E unit generates an alarm when it receives a *UAI*.

NET RAI Received Alarm (Remote Alarm Indication)—Enabled, Disabled (Default—Enabled)

Enabled—The DL600E unit generates an alarm when it receives an *RAI*.

DATA DTE Signal Loss Alarm—Enabled, Disable

Enable—The DL600E unit generates an alarm when a *DATA DTE Signal Loss* occurs.

Disable—Disables the function.

CV Threshold Alarm, CRC Threshold Alarm and *FE Threshold Alarm*

CV Threshold Alarm (Code Violation)— A x 10 ^ B (Default—Disabled)

Set A and B in *A x 10 ^ B*. Maximum threshold is 5 x 10^{-3}; minimum threshold is 8.1 x 10^{-9}. *Example:* 6 x 10^{-6}

The alarm is generated when the CVs exceed the threshold.

CRC4 Threshold Alarm—(Cyclic Redundancy Check) A x 10 ^ B (Default—Disabled)

Set A and B in *A x 10 ^ B*. Maximum threshold is 1; minimum threshold is 1.7 x 10^{-5}. *Example:* 1.2 x 10^{-2}

The alarm is generated when the CRC4s exceed the threshold.

FE Threshold Alarm (Frame Error Event) —A x 10 ^ B (Default—Disabled)

Appears in the menu only when the remote unit is a DL600E unit and applies only to it. Set A and B in *A x 10 ^ B*. Maximum threshold is 7.5 x 10^{-2}; minimum threshold is 2.1 x 10^{-6}. *Example:*
4 x 10^{-4} The alarm is generated when the FEs exceed the threshold.

Alarm Conditions and System Action

Table 4-2 lists the alarm conditions and the DL600E unit action.

Table 4-2 DL600E Alarm Conditions and System Action

Condition	Action
Loss of data port	DL600E unit sends a *Framed All Ones* to E1 network. *Loss of Signal* appears in *DATA DTE Status*, *Menu-1 Main Status*
Loss of Signal or Loss of Frame on network and AUX E1 ports	DL600E unit sends a *Remote Alarm Indication* signal to network port, drops RLSD line on data port. *Loss of Signal* or *Loss of Frame* appears in *Network Status*, *Menu-1 Main Status*
Remote Alarm Indication from network AUX E1 ports	*RAI Received* appears in *Network Status*, *Menu-1 Main Status*
Unframed All Ones on Network AUX E1 ports	DL600E unit sends a *Remote Alarm Indication* signal to network port, drops RLSD line on data port. *UA1 Received* appears in *Network Status*, *Menu-1 Main Status*.

In the example in Figure 3-7, the remote unit can be a DL600E1 or a DL600E unit.

```
SW Ver 1.0          MIB Ver 1.1     Digital Link DL600E          4/22/96
HW Ver A                            Menu-8 Alarm II              12:56:56
                                    Local:  OAHU              Remote:  MAUI

External Alarm Input Indication                                  Disable
External Alarm Input Contacts                                Normally Closed
External Alarm Input Message
External Alarm Output Indication                                 Disable
External Alarm Output Contacts                               Normally Closed

Connection                  In-Band Commmunications                  Modem
Timeout When Logged On                        1 Min                 15 Min
Timeout When Not Logged On                    1 Min               Unlimited
Phone Number 1              ATDT9,1-408-524-7433      ATDT9,1-408-745-6200
Phone Number 2              ATDT9,1-408-524-7622      ATDT9,1-408-745-6200
Normal User Password                          *                         *
Superuser Password                            *                         *

COMM  DCD                                  Enabled                 Enabled
      XON/XOFF                             Disabled          XOFF until Any

0-SNMP Config.  1-Main Status  2-Data DTE Status  -Reports  4-Main Config.
5-Data Port Config.  6-Timeslot Config.  7-Alarm I  8-Alarm II  9-Diagnostics
Type Arrow keys to move the selection,  RETURN to change a selection
or type 0 through 9 for a new menu:
```

Figure 3-7 Menu-8 Alarm II

Menu-8 Alarm II Parameters

External Alarm Input Indication—Enabled, Disabled (Default—Disabled)

Appears on the menu only when the remote unit is a DL600E unit and applies only to it.

Select *Enabled* to receive alarms from an external source (such as a door opening or a burglar alarm).

External Alarm Input Contacts—Normally Open, Normally Closed (Default—Normally Open)

Appears on the menu only when the remote unit is a DL600E unit and applies only to it.

Select *Normally Open* or *Normally Closed* depending on how the mechanism from the external source (such as a door opening or a burglar alarm) is set.

External Alarm Input Message—(20 characters maximum)

Appears in the menu only when the remote unit is a DL600E unit and applies only to it.

Enter an alarm message (20 maximum) that will appear when an external alarm occurs. E*xternal Alarm Input Indication* must be enabled and *External Alarm Input Contacts* must be properly set.

External Alarm Output Indication—Enabled, Disabled (Default—Disabled)

Appears in the menu only when the remote unit is a DL600E unit and applies only to it.

Select *Enabled* to enable a device, connected to the *ALARM OUT* connector (such as a bell or light)

External Alarm Output Contacts—(Default—Normally Open)

Appears in the menu only when the remote unit is a DL600E unit and applies only to it.

(View only) *Normally Open* —Always.

Connection—In-Band Communications, Modem, Direct (Default—Direct)

Select the connection you are using.
In-Band Communications—Enables a remote unit connectrion.
Modem—Enables a modem connection to the DL600E unit.
Direct—Enables a direct terminal connection to the DL600E unit.

Timeout When Logged On—1 Min, 15 Min. 30 Min., Unlimited (Default—Unlimited)

Applies only when you are logged on. This is the time span after which, if it does not detect activity, the system warns you will be logged off in 30 seconds.

Timeout When Not Logged On—1 Min, 15 Min. 60 Min., Unlimited (Default—Unlimited)

Applies only when a terminal is connected through a modem and you are not logged on.This is the time span after which the modem disconnects the phone line if no activity is detected.

Phone Number 1

Enter a valid telephone number (20 characters maximum). The modem dials out using the first telephone number, then automatically tries the second telephone number if the first does not respond.

Phone Number 2

Enter a valid telephone number (20 characters maximum).

Normal User Password—(text string)

Enter the login password for the *Normal User* (10 characters maximum).

Superuser Password—(text string)

Enter the login password for the *Superuser* (10 characters maximum).

Δ **Note:** Refer to "Configuring Two Levels of Access Rights" earlier in this chapter.

COMM DCD—Enabled or Disabled (Default—Disabled)

Enabled—The DL600E unit uses the modem's *Data Carrier Detect (DCD)* signal to provide more robust modem operation.

Disabled—Use *Disabled* if your null modem does not pass the *Data Carrier Detect* signal.

COMM XON/XOFF—Disabled, XOFF until ANY, XOFF until XON (Default—XOFF until XON)

XOFF until ANY—**Ctrl-S** stops data flow from unit, any key resumes data flow.

XOFF until XON—**Ctrl-S** stops data flow from unit, **Ctrl-Q** resumes flow.

Disabled—XON/XOFF feature disabled

4

Monitoring and Managing the DL600E Unit

- *Introduction 4-2*
- *Logging on to the DL600E 4-2*
- *Logging Off 4-6*
- *Monitoring Status 4-6*
- *Displaying Performance Reports 4-11*

Introduction

The DL600E unit collects and displays performance data as well as additional data useful for network troubleshooting.

You can monitor and manage the unit from a terminal, remote terminal Telnet connection, or an SNMP management station.

The DL600E unit monitors the E1 line continuously and displays all collected data on the terminal screen.

The terminal interface menus enable you to:

- Display or modify the E1 network configuration in *Menu-4 Main Configuration*
- Configure alarm conditions, passwords, and modem connection in *Menu-7 Alarm I* and *Menu-8 Alarm II*
- Monitor the status of the E1 network, AUX E1 port, and data ports in *Menu-1 Main Status* and *Menu-2 Data DTE Status,* respectively.
- Monitor the E1 performance data base in *Menu-3 Performance Reports*

This chapter describes how to monitor the DL600E status, display performance reports and configure alarm conditions.

Logging on to the DL600E

There are two ways to access the DL600E terminal interface:

- From a terminal connected (directly or through a modem) to the DL600E Comm Port
- From a remote terminal Telnet connection

User Access Rights

Two levels of access rights are available when you log on to the DL600E unit:

- Superuser access rights
- Normal User access rights

With the *Superuser* password, you can:

- Log off a *Normal User* already logged on the DL600E unit

- Change both passwords
- Clear both passwords giving *Superuser* access to all users

With the *Normal User* password, you can:

- Log on only when no one is logged on
- Be logged off by a *Superuser*

The *Superuser* and *Normal User* passwords are set in *Menu-8 Alarms II*. Refer to "Configuring Two Level of Access Rights" in Chapter 3.

The conditions for logging on differ when the DL600E terminal interface is free and when another user is already logged on. They are described in the following sections.

Logging on from a Terminal

You must know the DL600E ID to log on to it. Press **Ctrl-x five times** to display all IDs of cards connected in a daisy-chain (a single RS-232 multidrop).

The default ID, a six-character alphanumeric, is the DSU's portion of the serial number, for example: FE0086.

To log on to the DL600E unit when no other user is logged on:

---

1 Press **Ctrl-x,** type the unit ID and press **Return**.

2 If the unit is password protected and no other user is logged on, you are prompted:

Current Unit ID is MAUI.
Now you need a password to log in:

Type in the *Superuser* or *Normal User* **password** and press **Return**.

Menu-1 Main Status appears.

If it does not, you may have an incorrect ID, a bad connection on the Comm Port or a bad Comm Port configuration.

Systems with blank IDs are always logged on and cannot be logged off until a unit ID is assigned.

Logging on In Other Conditions

The system responds differently depending on the log on conditions on the DL600E unit.

System messages and your action	Condition on DL600E
Case A	
System:	Normal User logged on.
Current Unit ID is MAUI. *The Terminal User Interface is already in use. Please enter the Superuser password to force the other user to log off or type <Ctrl-X> and try again later.* • Enter the *Superuser* password to log off the Normal User. • Enter the *Superuser* password a second time when prompted to log on as the Superuser or enter the *Normal User* password to log on as the Normal User. If you don't know the *Superuser* password, log off with Ctrl-x and try again later.	
Case B	Superuser logged on
System:	
The Superuser is already logged on. Try again later.	You can't log on.

Δ **Note:** The system forces you off after the fifth attempt to log on.

Logging On Using a Telnet Connection

To log on to the DL600E user interface using a Telnet connection:

1 Enter the *telnet* command and the DL600E IP address.

Example of system response:

Current Unit ID is MAUI.
Now you need a password to log in:

2 Enter the *Normal User* or *Superuser* password.

Logging On In Other Conditions

The system responds differently depending on the log on conditions on the DL600E unit.

System messages and your action	Condition on DL600E
Case A System: *Current Unit ID is MAUI.* *The Terminal User Interface is already in use. Please enter the Superuser password to force the other user to log off or type <Ctrl-X> and try again later.* • Enter *Superuser* password to log off Normal User. System: `Password`: (example) • Enter the *Superuser* password a second time to log on as the Superuser or enter the *Normal User* password to log on as Normal User. If you don't know the *Superuser* password log off with Ctrl-x and try again later.	Normal User logged on
Case B System: *Current Unit ID is MAUI.* *The Superuser is already logged in to the Terminal User Interface. Please type <Ctrl-X> and try again later.*	Superuser logged on. You can't log on.

The system logs you off after five unsuccessful attempts to log on.

Logging Off

To log off, press **Ctrl-x**.

You are logged off when the terminal stops responding to keystrokes.

Monitoring Status

Monitor the status of the DL600E unit from *Menu-1 Main Status* and the status of its data ports from *Menu-2 Data DTE Status*.

Figure 4-1 shows an example of *Menu-1 Main Status*. The remote unit is a DL600E unit with an AUX port.

```
SW Ver 1.0  MIB Ver 1.2         Digital Link DL600 Encore                  4/22/95
HW Ver A                           Menu-1 Main Status                      12:56:28
                                    Local:  OAHU                    Remote:  MAUI

Unit Status                              No Clock                           Normal
                                Payload Loopback(FULL)
Network Status                             Normal                    RAI Received

AUX DTE Status                                                             Normal
DATA DTE Status                    Loss of Signal                          Normal
Alarm Input Status              Temperature Alarm on                       Normal


Error Free Seconds                        100.0%                             96.5
CRC4 Errors                                  23                              654
Code Violations                             255                              325
Frame Error Events                                                             1

  Seconds In Current 15 Min.                421                             21
  Errored Seconds In Interval                 0                              2

 0-SNMP Config.  1-Main Status  2-Data DTE Status   3-Reports   4-Main Config.
 5-Data Port Config. 6-Timeslot Config.  7-Alarm I 8-Alarm II  9-Diagnostics

 Type C to clear the counters or type 0 through 9 for a new menu:
```

Figure 4-1 Menu-1 Main Status

To clear the counters, press **c**.

Press **y** to confirm after the system prompt:
Do you really want to clear the error counters (Y/N)?

(or press any other key to take no action.)

Any status related to the counters may take up to a minute to clear.

Values for CRC Errors and Code Violations are set to 0.

Menu-1 Main Status Parameters

All parameters in Menu-1 are read-only.

Unit Status

Unit Status indicates if the DL600E unit is operating normally or if any special conditions exits. When the DL600E unit is executing a test, the test is indicated in this field. (If the test is running on a port, the port appears in parenthesis.

Indication	Description
Normal	No abnormal conditions exist
Self Test	Unit is running self test.
DTE Loopback (fraction)	Unit is in DTE loopback
AUX E1 Loopback (fractional)	
NET Loopback (full)	Unit is in network loopback.
PLD Loopback (fraction)	Unit is in payload loopback.
Send User 1 (fraction)	Unit is sending *User 1* pattern.
Send User 2 (fraction)	Unit is sending *User 2* pattern.
Send 1:1 (fraction)	Unit is sending alternate 1s and 0s pattern.
Send 1:2 (fraction)	Unit is sending standard loop down remote code continuously.
Send 1:4 (fraction)	Unit is sending standard loop up remote code continuously.
Send 1:7 (fraction)	Unit is sending *1:7* pattern.
Send 3:24 (fraction)	Unit is sending *3:24* pattern.
Send QRW (fraction)	Unit is sending *QRW* code.
Send All 1s (fraction)	Unit is sending all ones signal.
Send All 0s (fraction)	Unit is sending all zeros signal.
LP UP Remote (fraction)	Unit is sending loopdown code to remote unit for 15 seconds.
LP DN Remote (fraction)	Unit is sending loopup code to remote unit for 15 seconds.
Send RAI	Unit is sending RAI (Remote Alarm Indication).
No Clock	Clock source has failed.
Lamp Test	Unit is undergoing *Lamp Test*.

Network Status

Network Status indicates any abnormal conditions present on the received E1 signal.

Indication	Description
Normal	No abnormal conditions exist
Loss of Signal	Network signal is missing.
Loss of Frame	Network frame is missing.
RAI Received	Unit has received RAI.
UA1 Received	Unit has received UA1.
Set Code Received	Unit has received set code.
Reset Code Received	Unit has received reset code.
CV Threshold Exceeded	CV Threshold exceeded.
CRC Threshold Exceeded	CRC Threshold exceeded.
FE Threshold Exceeded	FE Threshold exceeded on remote unit only when remote unit is DL600E unit.

Local AUX E1 Port Status

Local AUX E1 Port Status indicates any abnormal conditions present on the received E1 signal of the AUX E1 port if this option is installed.

Indication	Description
Normal	No abnormal conditions exist
Loss of Signal	Network signal is missing.
Loss of Frame	Network frame is missing.
RAI Received	Unit has received RAI.
UA1 Received	Unit has received UA1.
Set Code Received	Unit has received set code.
Reset Code Received	Unit has received reset code.
CV Threshold Exceeded	CV Threshold exceeded.
CRC Threshold Exceeded	CRC Threshold exceeded.
FE Threshold Exceeded	FE Threshold exceeded on remote unit only when remote unit is DL600E unit.

Remote AUX DTE Status

Remote AUX DTE Status appears only when the remote unit has an AUX port and applies only to the AUX port.

Indication	Description
Normal	No abnormal conditions exist
Loss of Signal	Loss of DTR or RTS DTE lines, user defined.
Loss of Frame	Unit has received Loss of Frame signal
RAI Received	Unit has received RAI.
UA1 Received	Unit has received UAI.
Blank	Blank for local DL600E unit.

DATA DTE Status

DATA DTE Status indicates abnormal conditions present on the received DATA DTE signal on a data port.

Indication	Description
Normal	No abnormal conditions exist
Loss of Signal	Loss of DTR or RTS DTE lines, user defined.
Local Test	A DTE port has activated local test.

Alarm Input Status—Normal or a 20 character user text.

Displays *Normal* when no alarms are present. When an external alarm occurs, displays the message entered in the *External Alarm Input Message* in *Menu-8*.

Error Free Seconds—0 to 100%

Gives the percentage of error free seconds.

CRC Errors—(Cyclic Redundancy Check Errors)

An error checking scheme used to check the received data. The last six frame bits are calculated using the contents of the frame. The calculation is performed again when the frame is received and the CRC values are compared. If they do not match, the frame is considered bad and the CRC statistic is incremented.

Code Violations

An error checking scheme. A code violations occurs when the ones bit is not represented with the opposite signal of the previous ones bit.

Frame Error Events

Used only by the remote DL600E unit. A *Frame Error* event occurs when the end of the frame is not detected where it should be.

Seconds in Current 15 Min.

Displays the number of seconds elapsed in the current 15-minute interval.

Errored Seconds in Interval

Displays the number of errored seconds elapsed in the current 15-minute interval.

Menu-2 Data DTE Status

Menu-2 Data DTE Status shows the current status of the selected data port of the DL600E unit and the data port(s) of a remote unit.

Figure 4-2 shows an example of *Menu-2 Data DTE Status* in which the remote unit can be either a SoloE1 Encore, Ensemble Encore SoloE1 Shelf card, or DL600E unit.

```
SW Ver 1.0  MIB Ver 1.2     Digital Link DL600 Encore          4/22/95
HW Ver A                      Menu-2 Data DTE Status          22:43:42

Port     Local        Remote

DATA1    Local Test   Local Test









0-SNMP Config.  1-Main Status   2-Data DTE Status  3-Reports  4-Main Config.
5-Data Port Config. 6-Timeslot Config. 7-Alarm I  8-Alarm II 9-Diagnostics.

Type 0 through 9 for a new menu:
```

Figure 4-2 Menu-2 Data DTE Status

Data DTE Status Parameters

Data Port # — *Local Test, Signal Loss, Normal*

Indicates the port status. If the local or remote system does not have a port in this position the field is blank.

Signal Loss and *Local Test* are mutually exclusive because the DL600E unit uses the same interface lines to initiate the test and to indicate the signal loss.

Displaying Performance Reports

To manage and monitor the DL600E unit, use *Menu-3 Performance Reports* which displays performance data for the previous 24 hours. Figure 4-3 shows an example of the DL600E as a remote unit.

```
SW Ver 1.0 MIB Ver 1.2         Digital Link DL600 Encore        4/22/96
HW Ver A                      Menu-3  Performance Reports      12:40:12
                           Carrier Registers, 24 hour detail
                     Local: OAHU                    Remote: MAUI

Local Interval
 Star          ES    CRC     CV     FE                ES    CRC      CV
03:38:53        0    123      2     12                 6     65       4
03:23:53        0      0      3      8                 2      5       0
03:08:53        2     65    157     18                 3     17       8
02:53:53        9      0     32      7                 7     15       6
02:38:53        0    123      2     12                 6     65       4
02:23:53        0      0      3      8                 2      5       0
02:08:53        2     65    157     18                 3     17       8
01:53:53        9      0     32      7                 7     15       6
01:38:53        0    123      2     12                 1     65       4
01:23:53        2     65    157      8                 3     17       8
01:08:53        0      2      3      8                 2      5       0
12:53:53        9      0     32      7                 7     15       6
                                Page 1 of 8

0-SNMP Config.1-Main Status 2-Data DTE Status 3-Reports 4-Main Config.
5-Data Port Config.6-Timeslot Config.7-Alarm I 8-Alarm II 9-Diagnostics
Type the UP and DOWN arrow keys to scroll,
or type 0 through 9 for a new menu:
```

Figure 4-3 Carrier Registers, 24 hour Detail

Events in the Performance Reports

The events in the *Menu-3 Performance Reports* are

Errored Seconds (ES)

A second with one or more CRC errors.

Cyclic Redundancy Check (CRC)

The CRC count is incremented in this error checking feature, which compares frames at each end. When the frames do not match, they are considered bad and the CRC is incremented.

CVs (CV)

Number of Code Violations.

Framing Errors (FE)

Number of frame errors.

5

Using the Front Panel Interface

- *Introduction 5-2*
- *Preparing for the Initial Configuration 5-7*
- *Configuring the Unit and Network Parameters 5-13*
- *Allocating Timeslots 5-14*
- *Configuring for SNMP 5-18*
- *Using the MONITOR Menu 5-19*
- *Using the TEST Menu 5-20*

Introduction

This chapter describes the front panel interface of the DL600E unit.

The front panel interface lets you:

- View and change the DL600E configuration from the *CONFIGURATION* menu
- Monitor and manage the DL600E unit from the *MONITOR* menu
- Run diagnostic tests on the DL600E unit from the *TEST* menu

The front panel interface is easy to use if you are an experienced user. If you are not, the best way to learn the system's contents and organization is to use the terminal interface. It displays the system in menus while the front panel interface displays only one line item at a time.

Use the front panel when a terminal is not readily available. At times, it is easier to use the front panel interface to perform a task rather than connect a terminal to do the same from the terminal interface.

What You Can't Do From the Front Panel Interface

The front panel interface does not provide for setting:

- Alarm conditions and thresholds
- Superuser and Normal User passwords
- Modem connection and telephone numbers

You must use the terminal interface to set these parameters.

Front Panel Description

The front panel interface, shown in Figure 6-1, consists of a 16-character fluorescent display and four keys. The interface displays one line of information at a time. Use the four keys to interact with the front panel interface.

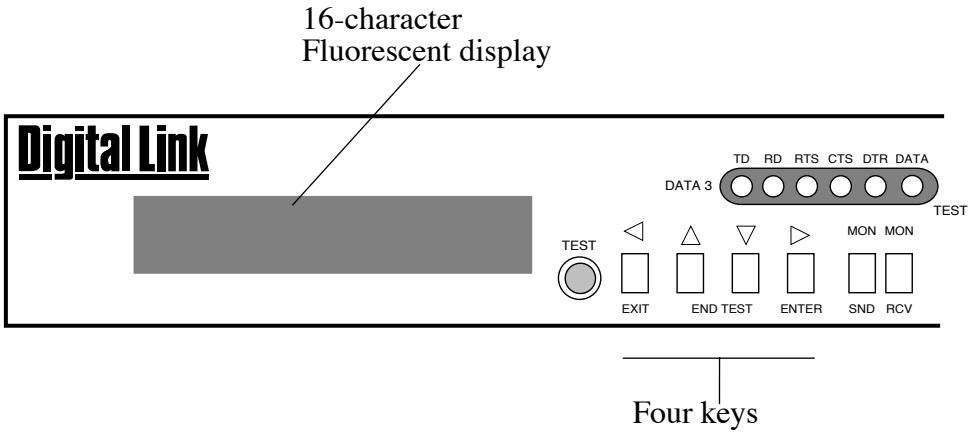


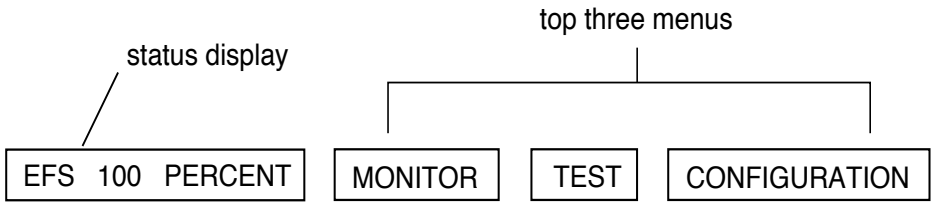
Figure 6-1 Front Panel Interface

If the DL600E unit is the **remote** unit, the left most character of the display is an **R.** (No character appears on the local unit.)

The front panel interface can be disabled only from the terminal interface, using *Protect Mode* in *Menu-4 Main Configuration.*

How to Navigate the Front Panel Interface

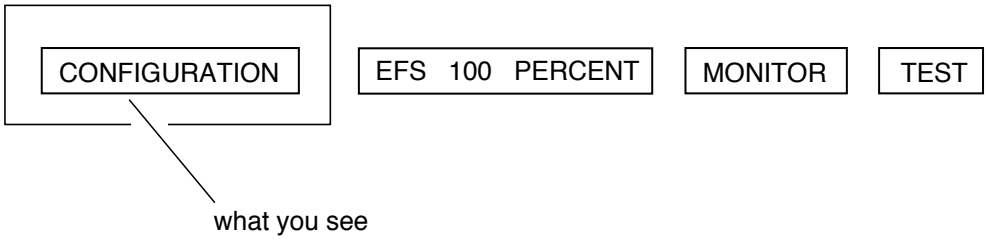
The front panel interface is organized into three main menus which are at the top level of the hierarchical structure shown below.



Each menu may contain submenus which in turn may contain submenus. To open a menu, select the menu using the **Up** or **Down Arrow key** (▲ ▼) and press **ENTER.**

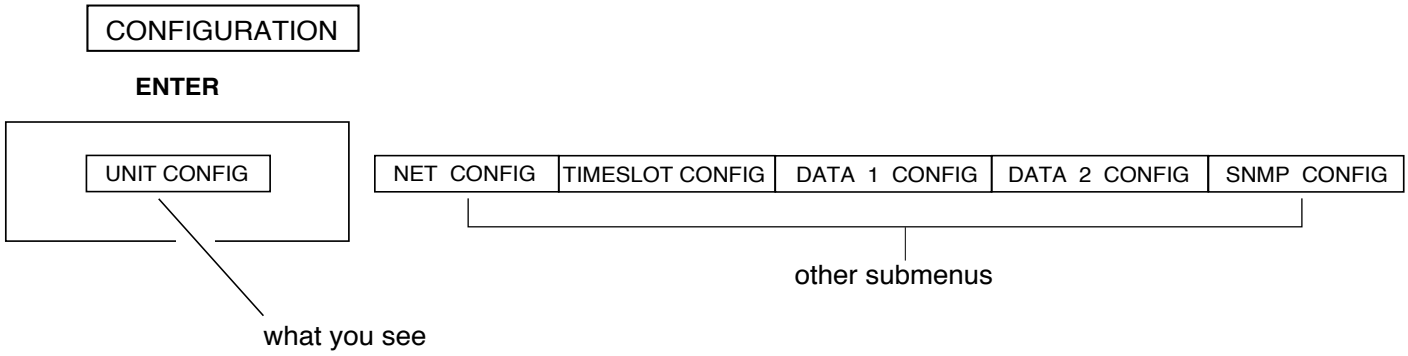
Display Description

One menu item at a time appears in the 16-character fluorescent display.



For example, when you open the *CONFIGURATION* menu, the *UNIT CONFIG*, a submenu appears.

To see another submenu, select it using the **Up** or **Down Arrow key** and **Return.**



Front Panel Keys

The system always indicates at the bottom of the status display what you can do immediately.

You can perform the following functions using the front panel keys at the appropriate time:

Moving About	**Key**
To cycle through the available options	**Up Arrow** or **Down Arrow**
To move down one menu level	**ENTER**
To move up one menu level	**EXIT**
To open a menu	**ENTER**

Editing Functions	**Front Panel Key**
To activate edit mode	**ENTER**
To execute a change in the configuration	**ENTER**
To exit without executing a change	**EXIT**

This chapter contains examples of how these keys are used.

Some menu items are more complex than others and require an in-depth understanding of the DL600E unit.

Refer to *Chapter 3, Configuring the DL600E Unit* for descriptions of individual parameters. They are not repeated in this chapter.

Editing a Parameter

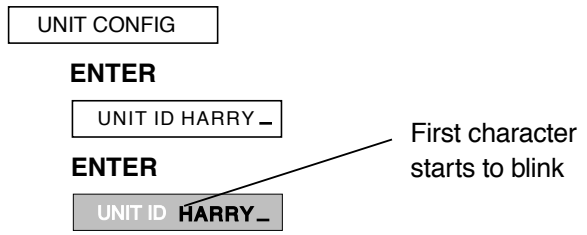
To modify a parameter such as the unit ID:

---

1 Press **ENTER** to open the *CONFIGURATION MENU*.

The *UNIT CONFIG* submenu appears.

2 Press **ENTER** to open this menu and **ENTER** again to activate edit mode (the first ID character starts to blink).



3 Edit the ID one character at a time.

When the character is blinking, use the **Up** or **Down Arrow key** to cycle to the desired character and press **ENTER** to select the character.

If you do not wish to edit a character, press **ENTER** to move to the next character position.

4 Press **ENTER** to confirm changes when the system prompts:

TO CHANGE CONFIG
YES--ENTER, NO--EXIT

or press **EXIT** to exit without executing the change.

Preparing for the Initial Configuration

Before you start an initial configuration, you need the required information ready and should establish a method of record keeping.

Required Information

Collect the following information:

- The DL600E **IP address** and **IP subnet mask** for establishing a Telnet connection to the DL600E unit from a remote terminal and enabling SNMP network management capability.
- One to three **NMS IP addresses** for enabling SNMP network management capability
- Framing and line code requirements as specified in the work order from your service provider

Keeping a Record

You should keep a written record of each unit's configuration. Use the **Configuration Worksheet** found in Appendix A.

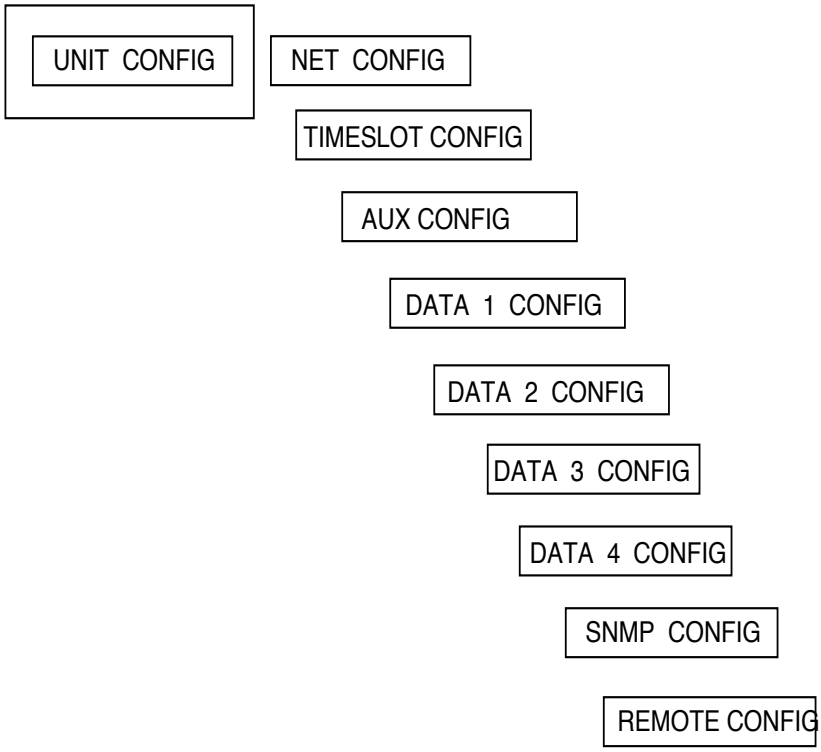
Configuring the Unit and Network Parameters

Use the *UNIT CONFIG* and *NET CONFIG* menus in the *CONFIGURATION* menu to configure the unit and network parameters, respectively.

To open the *CONFIGURATION* menu, use the **Up** or **Down Arrows** to move to the menu and press **ENTER**.

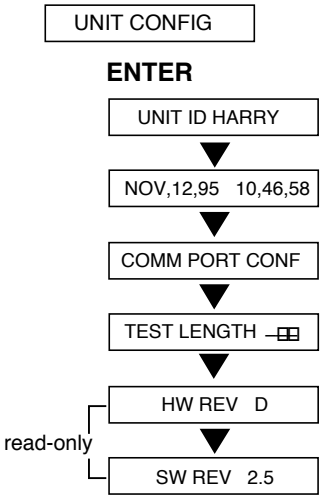
The *UNIT CONFIG* submenu appears.

The *CONFIGURATION* submenus are shown below.



The UNIT CONFIG Submenu

The items in the *UNIT CONFIG* menu are shown below.



Use the **Up** or **Down Arrows** to move from item to item. To activate edit mode, press **ENTER**.

For information about the *UNIT CONFIG* items, refer to *Menu-4 Main Configuration* in Chapter 3.

UNIT ID and **Date and Time**

Edit each item one character at a time. To move to the next character, press **ENTER**.

COMM PORT CONF submenu

You can display and modify the Comm Port settings only from the front panel *COMM PORT* submenu. Refer to page 5-10.

TEST LENGTH — 01M, 15M, 60M, --- (Unlimited)
(Default—Unlimited)

Test Length Appears in *Menu-9 Diagnostics* in the terminal interface. For more information, refer to Chapter 6.

The Comm Port Settings

The Comm Port parameters are: *BAUD RATE, PARITY, WORD LENGTH, STOP BITS, ENABLE DCD,* and *XOFF UNTIL.*

The front panel displays one parameter and its current value.

To view and modify the Comm Port settings, follow the procedure in the example below:

---

1 From the *CONFIGURATION* menu, press **ENTER** to move down to the *UNIT CONFIG* menu.

2 Press **ENTER** to open the *UNIT CONFIG* menu.

The *UNIT ID* parameter appears, for example:

```
UNIT ID HARRY_
```

3 Select the *COMM PORT CONF* submenu using the **Down Arrow** and **ENTER**.

BAUD RATE 9600 appears.

Press **ENTER** to activate edit mode. *(9600* starts to blink.)

4 Cycle through the available baud rate options using the **Up** or **Down Arrow** and press **ENTER** to select an option.

Press **ENTER** again to confirm the change when the system prompts:

TO CHANGE CONFIG
YES--ENTER, NO--EXIT

or press **EXIT** to exit without executing the baud rate change.

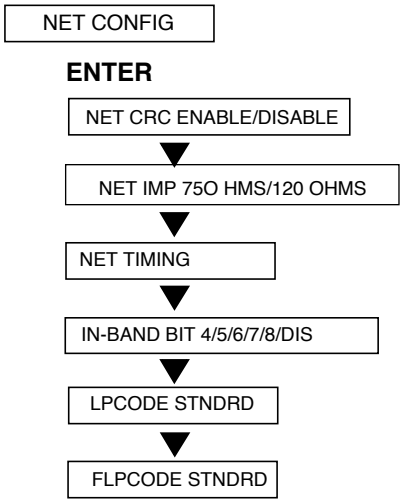
5 To move to the next Comm Port parameter, press the **Up** or **Down Arrow**.

Use the method described above to edit the parameter.

6 Power cycle the unit to execute changes.

The NET CONFIG Menu

The *NET CONFIG* menu contains the following items:



For a description of these items, refer to *Menu-4 Main Configuration* on in Chapter 3.

Notable Differences in the Front Panel Interface Three items are significantly different in this section from the terminal interface:

- Setting the external clock rate in *NET TIMING*
- Enabling in *NET IBC*
- Changing the full bandwidth and fractional bandwidth loop codes in *LPCODE* and *FLPCODE* respectively

These items are described in the following section.

Setting External Timing

You can set the external clock rate only from the front panel *NET TIMING* menu.

NET TIMING submenu

Use *EXT CLK* in this submenu.

---

1 Set the *MAIN* or *BKUP* clock source to *EXT* in *Menu-4 Main Configuration*. Refer to "Main/Alt Sync" in Chapter 3.

2 Set the external clock rate in the *EXT CLK* submenu. The clock rate is in increments of 56K or 64K and the options are:

2048, 1984, 1920, 1856, 1792, 1736, 1728, 1680, 1664, 1624, 1600, 1568, 1536, 1512, 1472, 1456, 1408, 1400, 1344, 1288, 1280, 1232, 1216, 1176, 1152, 1120, 1088, 1064, 1024, 1008, 960, 952, 896, 840, 832, 784, 768, 728, 704, 672, 640, 616, 576, 560, 512, 504, 448, 392, 384, 336, 320, 280, 256, 224, 192, 168, 128, 112, 64, *56*

Digital Link recommends the external clock source be a square wave of 50% duty cycle, TTL level (that is, 0 to 2.4Vmin)

The next section contains a detailed example of how to change network settings.

Example of Setting Network Timing In terminal mode, the default setting for network timing is *net/INT* in *Main/Alt Sync*. (refer to *Menu-4 Main Configuration* on in Chapter 3*)*. On the front panel, the default setting appears in two parts beginning with *NET TIMING*.

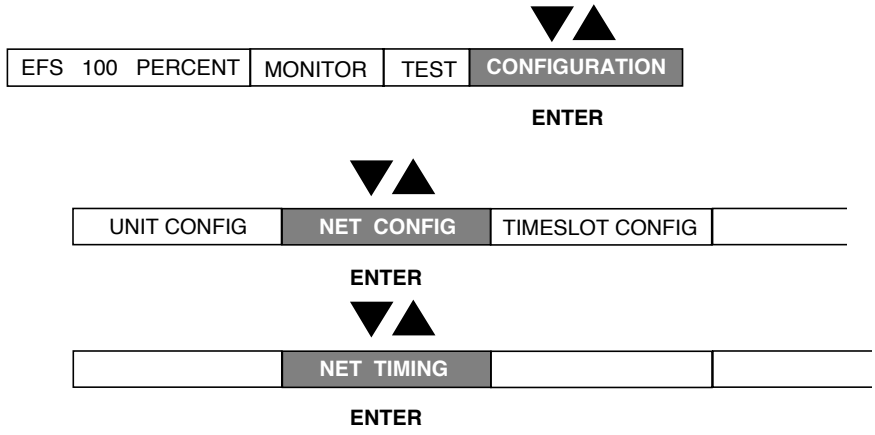
The example below shows how to change network timing.

---

1 From the top level, move to the **CONFIGURATION** menu with the **Up** or **Down Arrows** and press **ENTER** to open the submenu.

2 Open the **NET CONFIG** menu by using the **Up** or **Down Arrows** and pressing **ENTER**.

Open the **NETTIMING** submenu.



MAIN CLK NET appears.

Press **ENTER** to activate edit mode. *(NET* starts to blink.)

MAIN CLK **NET**

Cycle through the options *(EXT, INT, NET, DATA 4, DATA 3, DATA 2, DATA 1, AUX)* using the **Up** or **Down Arrows** and press **ENTER** when you come to *EXT*.

Press **ENTER** to confirm your action when the prompt appears.

3 Move to **BKUP CLK INT** and set the backup clock the same way you set the main clock.

4 Move to **EXT CLK** and select a frequency for the external clock.

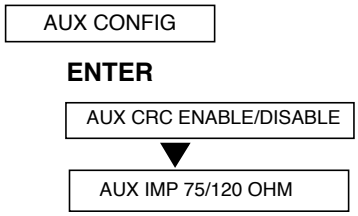
Enabling NET IBC

You can enable IBC only by using the In-Band Bit setting in the *Network Config* menu. Refer to "*Configuring the E1 Network Parameters*" in Chapter 3 for more information on the IBC.

The AUX CONFIG Menu

The *AUX CONFIG* menu appears on the front panel interface only when the optional auxiliary E1 port is in use.

It contains the following items:



Refer to Chapter 3 for a description of the auxiliary port parameters.

Configuring the Data Ports

Use *DATA 1 CONFIG, DATA 2 CONFIG, DATA 3 CONFIG,* and so on to configure data ports. Refer to "Configuring the Data Ports" in Chapter 3 for a description of the parameters.

To configure the data ports:

---

1 From the *CONFIGURATION* menu, press **ENTER** and open *DATA 1 CONFIG* using the **Up** or **Down Arrows** and **ENTER**.

DATA 1 NORMAL appears. (*NORMAL* is the default code.)

2 Press the **Down Arrow** to move to the next parameter, *LOS*. *DATA 1 LOS,RTS* appears. *RTS* is the default *LOS* parameter.

3 Press **ENTER** to activate edit mode.

RTS starts to blink.

(Or press **EXIT** to take no action and move to the next item)

Press the **Up** or **Down Arrows** to cycle through the available *LOS* options and press **ENTER** to select an option.

4 Configure the mode, format and clock for data port 1 using this method. Repeat for the other data ports using the appropriate menu for the data port.

Allocating Timeslots

Use the *TIMESLOT CONFIG* menu to view and allocate network timeslots. The default timeslot allocation is all 24 time slots allocated to port 1 — DTE01 TS=01 -- 31

If you make an incorrect selection, the system responds with an error message, such as *ERR DTE01 DTE02*

For information on allocating timeslots refer to "Allocating Timeslots" in Chapter 3.

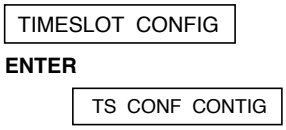
Displaying the Timeslot Allocation

To display the timeslot allocation for each port:

---

1 Press **ENTER** to open the *CONFIGURATION* menu and move to *TIMESLOT CONFIG* using the **Up** or **Down Arrows**, then press **ENTER** to open.

A submenu appears, such as *TS CONF CONTIG*.

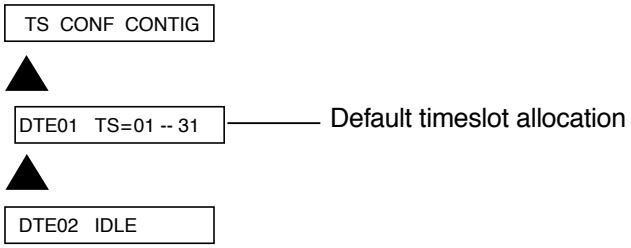


2 To see the timeslot allocation for port 1, press the **Up Arrow.**

To see the allocation for port 2, press the **Up Arrow** again.

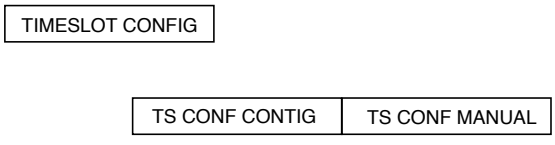
Repeat for the other ports (if you have them).

Example:



The TIMESLOT CONFIG Menu

The *TIMESLOT CONFIG* menu offers three allocation methods: *CONTIG*, *ALT* and *MANUAL*.



Refer to "Allocating Timeslots" in Chapter 3 for more information.

Changing the Allocation for Occupied Slots

When you try to allocate an occupied slot to another port from the front panel interface, an error message appears. You must first make a slot **idle** to allocate it to another port. (This restriction is present only on the front panel interface.)

Allocating Timeslots Contiguously Example

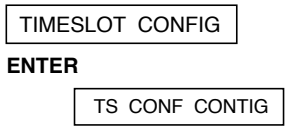
This example shows how to allocate timeslots 16 through 31 to data port 2. You are in default mode—all slots allocated to port 1. You will change the slot allocation for port 1 to 1 through 15 to free the last 16 slots and allocate the slots to port 2.

To allocate timeslots in a contiguous order:

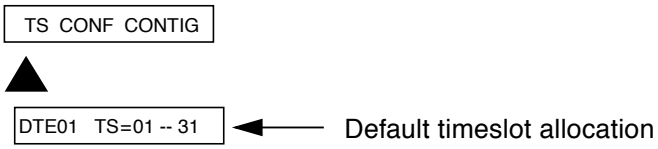
---

1 Open the *TIMESLOT CONFIG* menu by pressing **ENTER.**

The *TS CONFCONTIG* submenu appears.



2 Press the **Up Arrow** to move to data port 1.



3 To reallocate slots 1 through 15 to port 1:

— Press **ENTER** to activate edit mode.

The start timeslot *01*, start to blink.

— Press **ENTER** to move to the end timeslot which starts to blink.

— Press the **Down Arrow** repeatedly until you reach 15 and press **ENTER** to select it.

— Press **ENTER** to confirm your change when prompted:

TO CHANGE CONFIG
YES--ENTER, NO--EXIT

The timeslot allocation for port 1 appears:

DTE01 TS = 01 -- 15

4 To allocate slots to port 2:

— Move to port 2 by pressing the **Up Arrow**: DTE02 IDLE

— Press **ENTER** to activate edit mode.

— Press the **Up Arrow** (the start timeslot, *01*, starts to blink).

— Press the **Up Arrow** to move to slot 16 and press **ENTER** to select it and move to the end timeslot.

— Press the **Up Arrow** to reach 31 and press **ENTER**.

— Press **ENTER** to confirm your change when prompted:

TO CHANGE CONFIG

YES--ENTER, NO--EXIT

— The timeslot allocation for port 2 appears:

DTE02 TS=16 -- 31

Allocating Timeslots Manually in a Random Order Example

To allocate timeslots in a random order:
Timeslots 1, 4, and 8 — data port 1
Timeslots 5, 7, and 9 — data port 2

use the following example.

You are in default mode: DTE01 TS = 01 -- 31

---

1 From *TIMESLOT CONFIG*, press **ENTER**, then **ENTER** again to activate edit mode.

TS CONF CONTIG appears with *CONTIG* blinking.

TS CONF CONTIG

Use the **Down Arrow** to move to *TS CONF MANUAL* and press **ENTER**, then **ENTER** again to confirm the change.

TS CONF MANUAL

2 To select a network timeslot:

— Go to *TS CONFIG NET* by pressing the **Up** or **Down Arrow**.

TS CONFIG NET

You can now select a network timeslot and allocate it.

— Press **ENTER** to display the slot 1 status.

NET TS01 DATA01

— Press **Up Arrow** to open the display for network timeslot 2.

NET TS02 DATA01

— Press the **Up Arrow** to move to *IDLE* and press **ENTER** then **ENTER** again to confirm the change.

— For timeslot 5, press **ENTER** to open the display and **ENTER** again to activate edit mode for the port.

— Press **Up Arrow** and **ENTER** to move to and select data port 2.

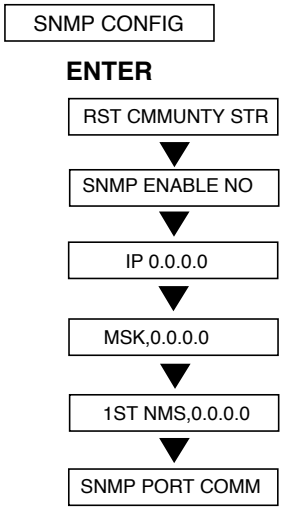
3 Use this method to manually allocate each network timeslot to a data port.

Configuring for SNMP

To configure the DL600E unit for SNMP from the front panel, use the *SNMP CONFIG* menu.

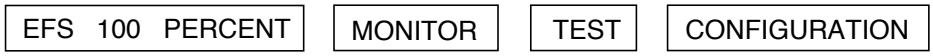
For a description of the SNMP parameters refer to “Configuring for SNMP” in Chapter 3.

The parameters in the *SNMP CONFIG* menu are



Using the MONITOR Menu

Use the *MONITOR* menu to display network status, DTE status and the network error counter.



The 24 hour line data is only available with the terminal interface or through the Network Manager.

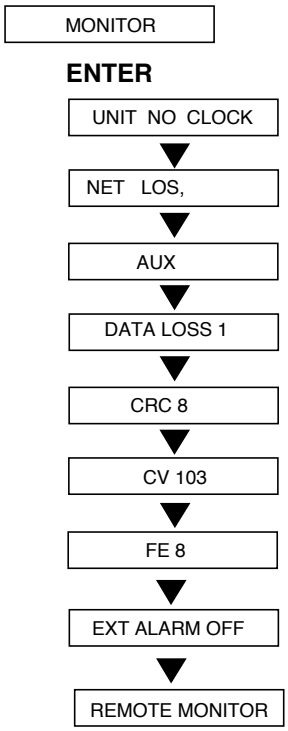
The data in the monitor menu is a subset of the parameters available on the terminal interface or through the Network Manager.

Both the Monitor and Configuration Menus can also access the remote unit.

Remote monitoring and configuration are only available with an IBC (In-Band Communications) channel attached to the remote unit. When you request status or configuration information from the remote unit, the local unit sends a request to it over IBC.

Monitoring the Local and Remote Units

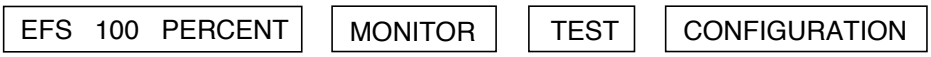
The parameters in the MONITOR menu are



For more information about monitoring the DL600E unit, refer to "Menu-1 Main Status Parameters" in Chapter 4.

Using the TEST Menu

You can perform the *Self-Test*, activate network loopbacks, test modes, and DTE loopbacks on the local DL600E unit from the front panel *TEST* menu.



Δ **Note**: The *TEST* menu does not appear on the front panel display if the front panel is protected in *Menu-4 Main Configuration* (*UNIT Protect* mode is enabled).

Only the *Network Loopback* test can be run on the remote unit from the *TEST* menu.

Starting and Ending a Test

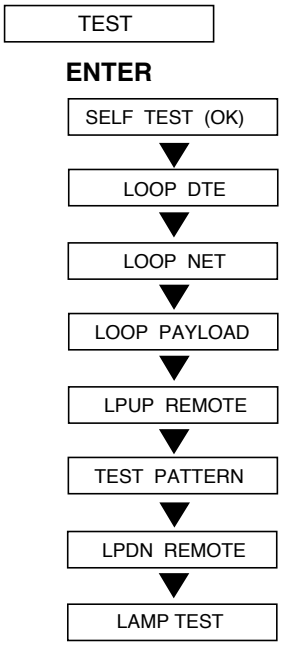
You can run only one test at a time. To run another test, you must terminate the first one.

---

1 To start a test, open the *TEST* menu and select the test from the menu or one of the sub-menus.

If you select a test that applies to a fraction of the E1 bandwidth, you are prompted to specify the fraction.

The test continues running until you end it.



2 To end the test, press

and **ENTER.**

The name of the terminated test appears in the *TEST* menu.

During a Test

During a test, observe the following:

- The TEST LED on the front panel turns green, indicating the DL600E unit is out of service during the test.
- The name of the current test appears on the display with a plus (+) at the end.
- You can open the *MONITOR* or *CONFIGURATION* menus to view the performance information or change the configuration.
- To exit the TEST menu, use **EXIT**.

Running a Full Bandwidth or Fractional LOOP DTE

Select *LOOP DTE* and press **ENTER** to open the sub-menu.

LOOP DTE (FULL) appears.

To start a **full bandwidth** test, press **ENTER**. When the system prompts press **ENTER** again.

LOOP DTE

ENTER

LOOP DTE (FULL)

ENTER

Sending a Test Pattern

The DL600E unit can also send test patterns to the network port. These patterns can be sent over the full bandwidth or over only a fraction of the bandwidth.

While sending the test pattern, the DL600E unit tries to lock on to the same pattern from the remote unit. It remains in this state until it achieves a lock or until you terminate the test.

When the DL600E unit achieves a lock with the signal from the remote unit, it displays:

PATTRN 0

As it detects errors in the received pattern, it displays the number of received errors on the front panel. The error count starts at 0 and can reach a maximum of 65,535. If it loses the pattern lock, it resumes searching.

Running a Full Bandwidth TEST PATTERN

To run a *TEST PATTERN* on the full bandwidth:

1. Select *TEST PATTERN* and press **ENTER** to open the menu.

2. Cycle through the options using the **Up** or **Down Arrow** and press **ENTER** to open the *TEST PTRN (FULL)* submenu.

3 Cycle through the full bandwidth patterns using the **Up** or **Down Arrow** and press **ENTER** to select the pattern and start the test. Press **ENTER** again when the system prompts to confirm.

The patterns are listed on page 5-24.

4 The DL600E unit starts sending the selected pattern and tries to lock on to the same pattern coming back from the remote unit.

The message *PATTRN SEARCHING* appears.

The test changes the DATA/TEST LED from green to red to indicate a test is being performed on the port.

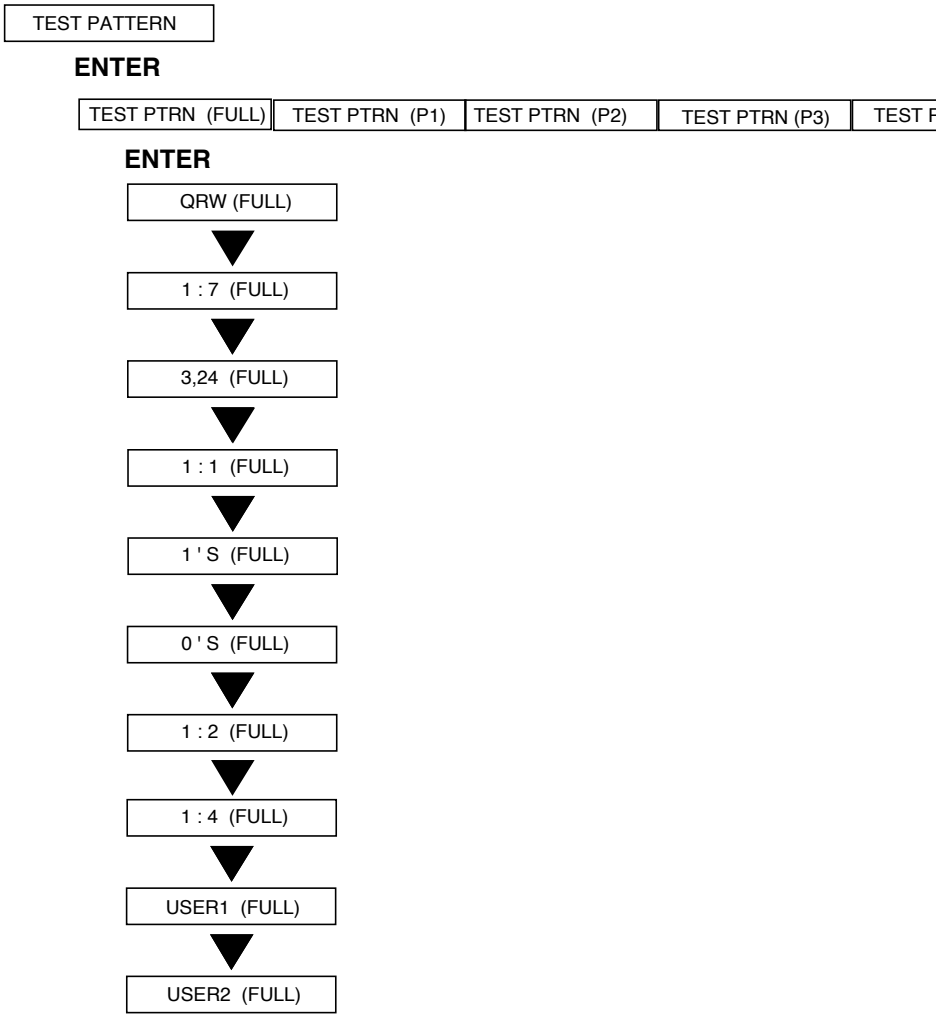
5 When the DL600E unit achieves a lock with the signal from the remote unit, it displays:

PATTRN 0

When it detects errors in the received pattern, it displays the number of received errors. The error count starts at 0 and can reach a maximum of 65,535. If it loses the pattern lock it resumes searching.

6 To end the test, press **END TEST** ▲ ▼ and **ENTER.**

Pattern Options



Running TEST PATTERN on a Fraction of the Bandwidth

To run *TEST PATTERN* on a fraction of the bandwidth:

---

1 Select *TEST PATTERN* and press **ENTER** to open the menu.

2 Use the **Up** or **Down Arrow** to cycle through the available options Press **ENTER** to open the *TEST PTRN (P1)* or *TEST PTRN (P2)* submenu.

3 Use the **Up** or **Down Arrow** to cycle through the available patterns. (Refer to "Pattern Options" on page 5-24.) Select the pattern and start the test by pressing **ENTER** and **ENTER** again when the system prompts you to confirm.

4 The DL600E unit starts sending the selected pattern over a fraction of the bandwidth and at the same time tries to lock on to the same pattern coming back from the remote unit.

The message *PATTRN SEARCHING* appears.

5 When the DL600E unit achieves a lock with the signal from the remote unit, it displays:

PATTRN 0

When it detects errors in the received pattern, it displays the number of received errors. The error count starts at 0 and can reach a maximum of 65,535. If it loses the pattern lock it resumes searching.

6 To end the test, press **END TEST** ▲ ▼ and **ENTER.**

LAMP Test

The *LAMP* test checks the LEDs on the DL600E mother board and all daughter boards.

---

1 Select *LAMP TEST,*

2 Press **ENTER,** then **ENTER** again to confirm your action.

All LEDs on the front panel should light up.

A defective LED will not light up.

3 To end the test, press **END TEST** ▲ ▼ and **ENTER.**

6

Diagnosing the DL600E Unit

- *Running Diagnostic Tests 6-2*
- *The Diagnostics Menu 6-3*
- *Test Parameters 6-4*
- *Test Types 6-6*
- *Running Tests from the Front Panel 6-10*

Running Diagnostic Tests

To verify the connections and E1 line, run the following basic diagnostic and pattern tests from *Menu-9 Diagnostics:*

- Loop DTE test
- Loop NET test
- Loop Local AUX E1
- Loop Payload test
- Loop Up Remote test
- Loop Down Remote test
- Various Pattern tests

You can also run these tests from the front panel. Refer to "Using the TEST Menu" in Chapter 5 for further information. Refer to Chapter 3 for further information about connecting a terminal to the DL600E unit.

You can initiate the tests and loopbacks on the full bandwidth or on the data port fraction. You can also set programmable test patterns.

Δ **Note:** You do not need to inform the telephone company you are running the tests. However, if the tests reveal a problem with telephone company service or with the DL600E unit, you should inform the telephone company that the DTE equipment or the DL600E unit must be removed from service.

The Diagnostics Menu

When running a test, you can:

- Initiate loopbacks and tests on the full bandwidth or on the data port fraction
- Set programmable test patterns

Figure Figure 6-1 shows an example of *Menu-9 Diagnostics*.

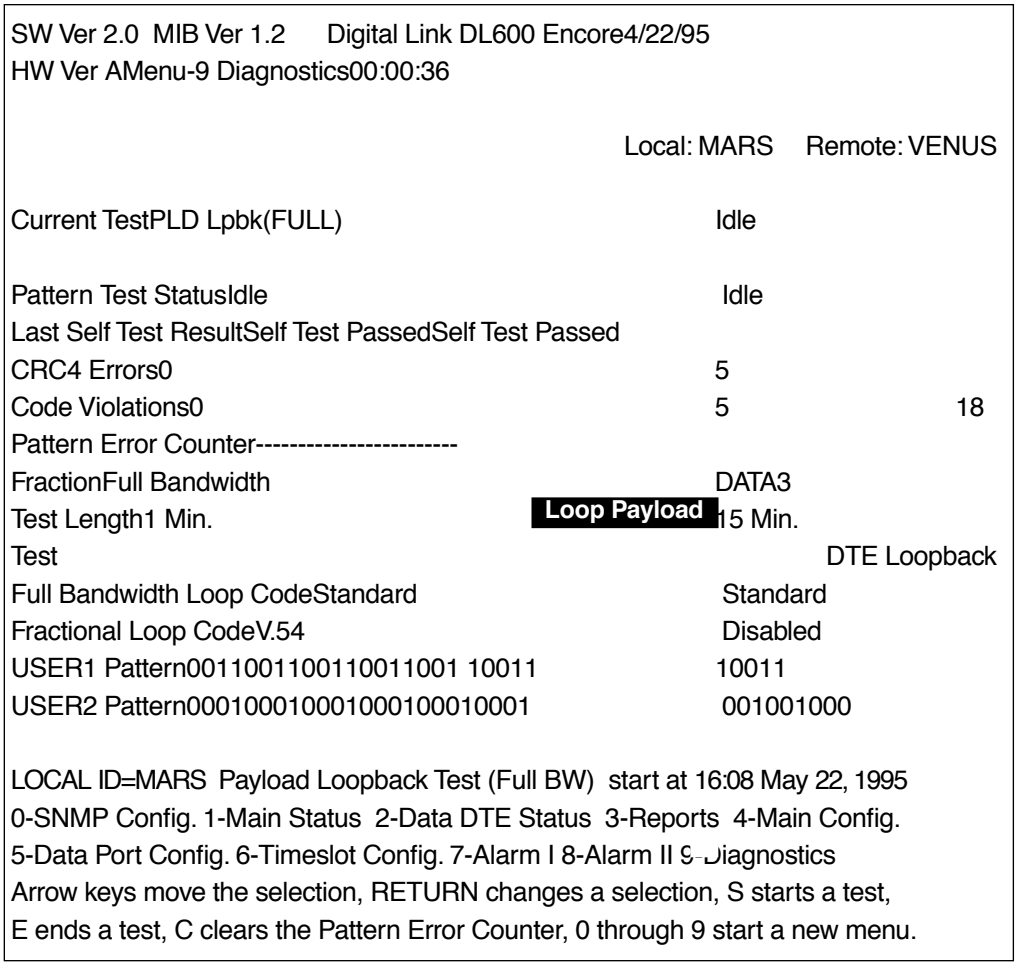

SW Ver 2.0 MIB Ver 1.2 Digital Link DL600 Encore4/22/95
HW Ver AMenu-9 Diagnostics00:00:36
Local: MARS Remote: VENUS
Current TestPLD Lpbk(FULL) Idle
Pattern Test StatusIdle Idle
Last Self Test ResultSelf Test PassedSelf Test Passed
CRC4 Errors0 5
Code Violations0 5 18
Pattern Error Counter----------
FractionFull Bandwidth DATA3
Test Length1 Min. Loop Payload 15 Min.
Test DTE Loopback
Full Bandwidth Loop CodeStandard Standard
Fractional Loop CodeV.54 Disabled
USER1 Pattern0011001100110011001 10011 10011
USER2 Pattern00010001000100010001 001001000
LOCAL ID=MARS Payload Loopback Test (Full BW) start at 16:08 May 22, 1995
0-SNMP Config. 1-Main Status 2-Data DTE Status 3-Reports 4-Main Config.
5-Data Port Config. 6-Timeslot Config. 7-Alarm I 8-Alarm II 9-Diagnostics
Arrow keys move the selection, RETURN changes a selection, S starts a test,
E ends a test, C clears the Pattern Error Counter, 0 through 9 start a new menu.

Figure 6-1 Menu-9 Diagnostics

Running a Test from Menu-9 Diagnostics

To run a test from *Menu-9 Diagnostics*, select the test in the *Test* field, set the *Test length*, and follow the screen prompts.

The test results are displayed in the upper half of the screen.

In the example in Figure Figure 6-1 the selected test, *Loop Payload*, is highlighted.

The selections for fractions on which the test is performed are *Full Bandwidth*, and *DATA01*. *Fraction* is ignored with the *Self Test, Network Loopback* or *Lamp Test*.

Test Parameters

This section describes the *Menu-9* parameters and tests.

Menu-9 Diagnostics Parameters

The parameters and options in the user selectable portion of *Menu-9 Diagnostics* are:

Fraction

Full Bandwidth, Data01, 02, 03, 04, AUX

Test Length

15 min., 1 min., 60 min., Unlimited
Test Length does not apply to *Self Test, Loop Up Remote* and *Loop Down Remote*.

Test

Self Test	1:1 Pattern	QRW Pattern
Loop DTE	1:2 Pattern	USER 1 Pattern
Loop Net	1:4 Pattern	USER 2 Pattern
Loop Payload	1:7 Pattern	All 0 Pattern
Loop Up Remote	3:24 Pattern	All 1 Pattern
Loop Down Remote	Lamp Test	

Full Bandwidth Loop Code

Standard, Alternate, Disabled

Fractional Loop Code

Standard, Alternate, V.54, Disabled

USER 1 Pattern and USER 2 Pattern

Enter any sequence of 1s and 0s, between 1 and 24 characters in length.

The parameters and options in the upper test status section of *Menu-9 Diagnostics* are:

Current Test

Idle
DTE Loopback (fraction)
NET Loopback (full)
PLD Loopback (fraction)
Send All 1s (fraction)
Send 1:1 (fraction)
Send 1:4 (fraction)
Send 3:24 (fraction)
Send User 2 (fraction)
Self Test
LP DN Remote (fraction)
LP UP Remote (fraction)
Lamp Test
Send All 0s (fraction)
Send 1:2 (fraction)
Send 1:7 (fraction)
Send User 1 (fraction)
Send QRW (fraction)

Last Self Test Result

Self Test Passed

Error nn (0 to 5)

CRC4 Errors

Error count (N/A if CRC4 is not enabled)

Code Violations

Error count

Pattern Error Counter

Error count

Test Types

Self Test

The *Self Test* checks the system's electronic components and performs a signal path check of the transmit and receive directions utilizing a simulated 4000 foot (1220 meter) E1 line.

The test feeds a QRW test pattern to the transmitter circuit, passes it through a simulated E1 line back into the receiver, then feeds the test pattern to the pattern detector circuit. When the code is successfully detected, the NET LED turns on and the Power/Self Test LED turns green. The PWR/TEST LED blinks yellow and then turns green when the test is successful. If the test fails, the LED turns red for ten seconds and then green.

The possible messages are

RUNNING SELF TEST
SELF TEST PASSED
<N>

Table 4-1 contains descriptions of self test error indicators.

Table 4-1 Self Test Error Indicators

Error indicators	Description
0	ROM Checksum test failed
1	RAM test failed
2	EEPROM Checksum test failed
3	DTE test failed
4	Pattern test failed
5	Flash Proms Checksum test failed

You can also run the *Self Test* from the front panel. Refer to "Using the TEST Menu" in Chapter 5 for further information.

Loop DTE Test

The *Loop DTE* test verifies the operation of the DL600E unit and its associated DTE cabling and equipment.

You can perform the Loop DTE only if the DTE equipment has a feature to send and detect a test pattern. The DTE equipment sends the full bandwidth signal through a 4000 foot (1220 meter) simulated line to the DL600 E1 network receive circuitry. It should receive the same signal it transmitted. The E1 network transmitter continues to transmit toward the network while the DL600E unit is in DTE loopback.

E1 transmission is interrupted during the test.

Δ **Note:** You do not need to inform the phone company before running this test. However, you should inform them if the test results indicate a phone company problem, or require the DL600E unit to be removed from service.

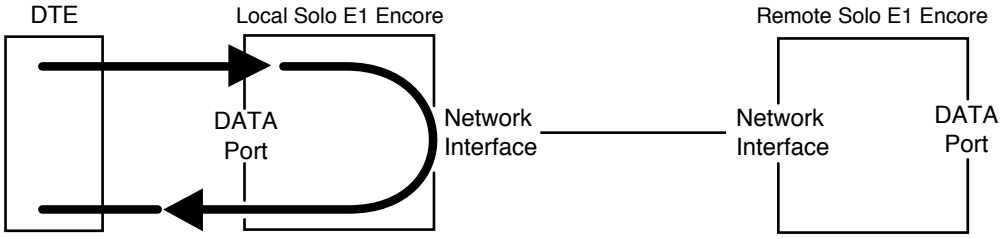


Figure 6-2 Loop DTE Test

Loop NET Test

The *Loop NET* test verifies the operation of the E1 network and is available only with full bandwidth. It loops the data received from the E1 network back to the network. The data is regenerated before it is looped back, however, the unit does not perform additional processing of the data. This minimizes the impact on the DL600E unit during the test so that network problems can be isolated.

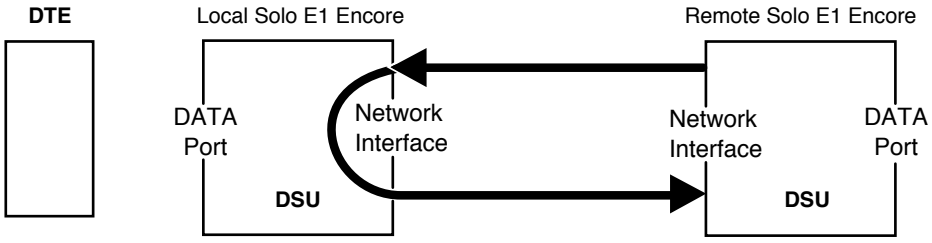


Figure 6-3 Loop NET Test

Loop Payload Test

The *Loop Payload* test verifies proper operation of the DL600E unit and the E1 network.

It loops the payload data received from the E1 network back toward the network. Before it is looped back, the data is regenerated and a new framing pattern is inserted. Thus, the proper E1 framing of the DL600E unit and network can be verified.

The individual channel *Loop Payload* loops a selected "fraction" of the E1 signal toward the network. In this mode, the selected data is corrected and the inband national bit is regenerated before the data is looped back to the network. Receive and transmit clocks and data are suppressed toward the data ports on the DTE channels. Payload service to ports not in loopback is not affected.

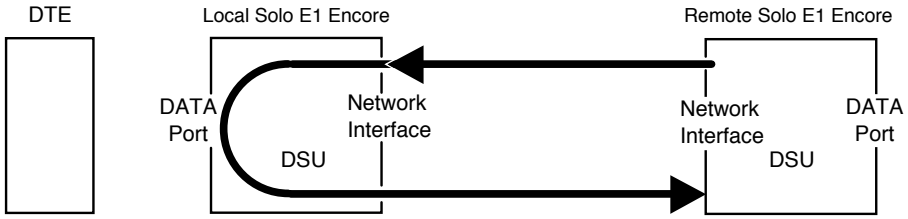


Figure 6-4 Loop Payload Test

Loop Up Remote and Loop Down Remote Tests

The local DL600E unit puts the remote unit into network loopback by momentarily transmitting the industry standard loop up code to the remote unit. If the remote unit does not go into network loopback within 15 seconds, a failure is declared and the DL600E unit stops sending the loop up code. The local and remote units' loop code and network parameters must **match**.

The *Loop Up Remote* test uses the industry standard set codes. Once in *Loop Up Remote*, test patterns can be sent to verify the Bit Error Rate (BER) performance of the bi-directional E1 network signal.

Use the *Loop Down Remote* test to terminate the remote loopback.

- **Note:** The full bandwidth loop up code puts the remote DL600E unit in a full bandwidth network loopback. The fractional loop up code puts the DL600E unit in a fractional (per individual port) payload loopback.

To run the Loop Up and Loop Down Remote tests from the front panel, press the *REMOTE LPBK UP* and DOWN buttons, respectively.

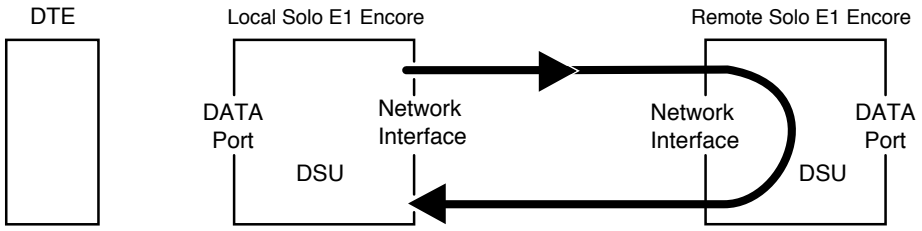


Figure 6-5 Loop Up Remote Test

QRW Pattern Test

Use the Quasi-Random Word (QRW) test to measure Bit Error Rates on the E1 network. The DL600E unit sends a QRW pattern into the network and monitors the received E1 network signal for QRW bit errors.

This test also looks for bit errors in both E1 circuit directions when the remote system is looped up. In this case, the system transmits the QRW to the E1 network and the remote system loops it back to the DL600E unit which monitors the signal for errors. You can also use the QRW code to isolate an E1 network problem to a specific transmission direction. In this case, both E1 transmission directions are monitored when the local and the remote system transmit QRW (the remote is not put into loopback).

Send 1:7 Pattern Test

This pattern stresses the timing recovery circuits of repeaters and other intermediate equipment.

Send 3:24 Pattern Test

This pattern tests for ones density (consecutive zeros) tolerance.

Send 1:1 Test

This pattern sends alternate ones and zeros. It tests for bridge taps.

Send All Ones Test

This pattern measures signal power.

Send All Zeroes Test

This pattern is useful for verification of HDB3 optioning of the E1 facility.

Send 1:4 Test (or Alternate)

The 1:4 code is the standard loop up remote code. It is typically used to put the remote system into loopback. You can determine if the failure is an intermittent or a hard failure by continuously sending the 1:4 code, and monitoring the network status to see if the pattern is being received.

The selections are available on the full bandwidth and on Data Port 1.

The full bandwidth code puts the remote system into full network loopback. When used on Data Port 1, the code puts the corresponding remote port into *Loop Payload*.

Send 1:2 Test

The 1:2 code is the standard loop down remote code. Use it when the *Loop Down Remote* test fails to terminate the remote loopback. You can determine if the failure is an intermittent or hard failure by continuously sending the 1:2 and monitoring the network status to see if the pattern is being received.

The selections are available on the full bandwidth and on Data Port 1.

The full bandwidth code takes the remote system out of full network loopback. When used on Data Port 1, the code takes the corresponding remote port out of *Loop Payload*.

User 1/User 2 Patterns Test

These two user programmable (up to 24 characters) patterns enable you to generate a test pattern rather than using pre-programmed patterns or live traffic.

Lamp Test

Use this test to verify the LEDs. During the test, all LEDs on the front panel light.

Running Tests from the Front Panel

You can also run the tests from the front panel. Refer to "Using the TEST Menu" in Chapter 5 for further information.

Appendix A

DL600E Technical Specifications

Technical Specifications

E1 Electrical Network Interface

Transmit line rate	2.048Mb/s ±50ppm
Receive line rate	2.048Mb/s ±75ppm
Line code	HDB3
Framing	ITU-TS G.704
Input signal	0 to 20 dB
Output signal	ITU-TS G.703
Electrical	ITU-TS G.703
Impedance	75Ω (BNC) unbalanced or 120Ω (DA-15) balanced

E1 AUX Interface (optional)

Transmit line rate	2.048Mb/s ±50ppm
Receive line rate	2.048Mb/s ±75ppm
Line code	HDB3
Data Rates	Nx64kbps (n=1 through 31)
Framing	ITU-TS G.704
Input signal	0 to -7 dB0
Impedance	75Ω (BNC) unbalanced or 120Ω (DA-15) balanced
Interference immunity	ITU-TS G.703

Data Interface

Number of ports	2 or 4
Interface types	V.35, X.21
Data rates	N x 64Kb/s (N = 1 through 31)

System Timing Requirements

Network
Internal
E1 Aux Port
Any Data Port via the SCTE (TT) line
External (Nx64 kHz or 1544 kHz)
Ext. Timing Connector, 75 Ohm BNC connector (TTL levels)

Front Panel

Display	16 character alphanumeric
Key Pad	4 keys
LEDs (per data port)	TD, RD, CTS, RTS, DTR, DATA/TEST
Status	Network Port, E1 Port, Test
Bantam Jacks	E1 Send (IN/MON), E1 Receive (MON)

Power Options

AC Input Voltage	120 to 220 VAC, 50 to 60Hz
DC Input Voltage	-48VDC (optional)
Power Consumption	10W maximum

Physical

Dimensions	43.2cm W x 30.5cm D x 4.37cm H (17"W x 12" D x 1.75"H)

Environmental

Operating temperature	0 to 50° C
Relative humidity	0 to 95% non-condensing
Altitude	4.6 km (15,000 ft. ASL) Reliability and Equipment Life
MTBF	13 years minimum
MTTR	30 minutes maximum

Diagnostics and Tests

Loopbacks	E1 Network, E1 Payload, DTE, Fractional E1 Payload, Fractional DTE
E1 Loopback Control	E1 Set/Reset Code, front panel, Comm Port, SNMP
Fractional Payload Loopback Control	CCITT V.54 Sequence, Comm Port
Test Patterns	QRW, 1-in-1, 1-in-7, 3-in-24, All 1s, All 0s, 1-in-2, 1-in-4, and 2 user-programmable patterns

SNMP

Full embedded SNMP agent based on SNMP v1, supporting RFC 1406, MIB II, with enterprise MIB.

Supported SNMP traps—Network Carrier Loss, Network Sync Loss, Network UA1 Received, Network RAI Received, Loss of DTE, Start of Test, End of test, CV Error Threshold Exceeded, CRC4 Error Threshold Exceeded.

Terminal Supported

ANSI (VT100) compatible terminal user interface supported

Equipment Grounding Conductor

The equipment grounding conductor or cable is connected to ground at the service equipment.

It should be installed as part of the circuit supplying the system and should not be smaller in size than the ungrounded branch-circuit supply conductors.

A bare, covered or insulated grounding conductor is acceptable. An individually covered or insulated conductor should have a continuous green, or green with one or more yellow stripes, outer finish.

The attachment-plug receptacle in the vicinity of the system should be of a grounding type and the grounding conductor serving the receptacle should be connected to earth ground at the service equipment.

Front Panel LEDs and Buttons

Table A-1 describes the front panel LEDs, buttons and connectors.

Table A-1 Front Panel LEDs and Buttons

TEST LED (Test in Progress LED)	Off Solid green	No tests are in progress A test condition exists
NET LED (Network Status LED)	Solid green Off Solid red Blinks red Solid yellow	E1 network operation normal Loss of network signal Loss of frame Receiving a CV, OOF or CRC *Remote Alarm Indication* bit asserted in signal from network port
AUX LED (E1 DTE Status LED)	Solid green Off Solid red Blinks red Solid yellow	E1 network operation normal Loss of network signal Loss of frame Receiving a CV, OOF or CRC *Remote Alarm Indication* bit asserted in signal from network port
DATA PORT LEDs		
TD	Solid green Off	Pulses from DTE detected No pulses from DTE detected

RD	Solid green Off	Pulses to DTE detected No pulses to DTE detected
RTS	Yellow Off	Receive to send line (RTS) from DTE is asserted Receive to send line removed
CTS	Yellow Off	Clear to send line (CTS) to DTE is active Clear to send line removed, indicating unit is not sending valid data
DTR	Yellow Off	Data terminal ready line (DTR) from DTE is active Data terminal ready line from DTE is inactive
DATA/TEST (Port in normal or test modes)		
	Off	Bandwidth not allocated
NET Loopback	Green	
Full Bandwidth Payload Loopback	Green	
Fractional Payload Loopback on the fraction that belongs to the port	Red	
Fractional Payload Loopback on another fraction	Green	
Full Bandwidth DTE Loopback	Green	
Fractional DTE Loopback on the fraction that belongs to the port	Red	
Fractional DTE Loopback on another fraction	Green	
Full Bandwidth Test Pattern	Green	
Fractional Bandwidth Pattern Test on the fraction that belongs to the port	Red	
Fractional Bandwidth Pattern Test on another fraction	Green	
Lamp Test	Yellow/Orange	
Self Test	Green	

EXIT Button	
EXIT	End operation or to higher level menu loop from a sub-menu loop
LEFT ARROW	LEFT ARROW Button in a few situations
ERROR FREE SECONDS	Successive pressing of the EXIT Button brings the user to the Error Free Seconds display
END TEST Buttons	
UP ARROW	Move up to previous menu or option
DOWN ARROW	Move down to previous menu or option
Pressing both buttons simultaneously to END TEST	Terminates all tests on local unit and brings the front panel menu to the Test Menu showing test just terminated
ENTER Button	Select a sub-menu loop or configuration option
	RIGHT ARROW button in a few situations

Factory Default Configuration

The DL600E factory default settings are listed below.

Unit Configuration

Unit ID	Unique ID assigned	Protect Mode	Disabled

Network Configuration

CRC4	Enabled	In-Band Communications Bit	
Main Synch. Source	Network	Alternate Synch Source	Internal

Data Port Configuration

Loss	DTR	Format	X.21
Mode	DCE	Clock	SCTE

Timeslot Allocation

Allocation Type	Contiguous	All Bandwidth Allocated to	DATA01

Diagnostic Configuration

User Pattern 1	001100110011001100110011
User Pattern 2	000000010000000100000001

Alarm Configuration

Block All Alarms	Disabled	Loss of Signal from data port	Enabled
Net Carrier Loss Alarm	Enabled	Net Sync Loss Alarm	Disabled
Net UA1 Received Alarm	Enabled	CV Threshold Alarm	Disabled
Net RAI Received Alarm	Enabled	CRC Threshold Alarm	Disabled

SNMP Configuration

IP Address	0.0.0.0	IP Subnet Mask	0.0.0.0
1st NMS Address	0.0.0.0	2nd NMS Address	0.0.0.0
3rd NMS Address	0.0.0.0	Set Community String	public
Get Community String	public	TRAP Community String	public
Forward over JBC	Disabled	Output Port	Comm

Comm Port and Terminal Configuration

Connection	In-Band Communications	Phone Number 2	Not Assigned
Timeout when not Logged on	Unlimited	Phone Number 1	Not Assigned
Timeout when not Logged on	Unlimited	Normal User Password	Not Assigned
Comm Port DCD	Disabled	Superuser Password	Not Assigned
Comm Port XON/XOFF	XOFF until XON		
Comm Port	9600, 8, no parity, 2 stop bits		

Configuration Worksheet

Use this worksheet to keep a written record of your configuration.

Unit Configuration

Unit ID	.....	Protect Mode	.....

Network Configuration

CRC4	.....	Line Impedance	.....
Main Synch. Source	.....	Alternate Synch. Source	.....
In-Band Communications Bit	.....		

Data Port Configuration

Code	.....	Format	.....
Mode	.....	Clock	.....
	.....		

Timeslot Allocation

Allocation Type	.....	Bandwidth Allocated to	.....

Diagnostic Configuration

User Pattern 1	.....
User Pattern 2	.....

Alarm Configuration

Block All Alarms	.....	Loss of Signal from data port	.....
Net Carrier Loss Alarm	.....	Net Sync Loss Alarm	.....
Net UA1 Received Alarm	.....	CV Threshold Alarm	.....
Net RAI Received Alarm	.....	FE Threshold Alarm	.....
	.....		

SNMP Configuration

IP Address	.....	IP Subnet Mask	.....
1st NMS Address	.....	2nd NMS Address	.....
3rd NMS Address	.....	Set Community String	.....
Get Community String	.....	TRAP Community String	.....
Forward over FDL	.....	Output Port	.....

Comm Port and Terminal Configuration

Connection	.....	Phone Number 2	.....
Timeout when Logged on	.....	Phone Number 1	.....
Timeout when not Logged on	.....	Normal User Password	.....
Comm Port DCD	.....	Superuser Password	.....
Comm Port XON/XOFF	.....	Configuration Mode	.....
Comm Port	.....		

DL600E Model Numbers

Table A-2 shows the model numbers of the equipment supplied to you by Digital Link.

Table A-2 DL600E Model Numbers

Model Number	Description
DL600E-AC-02	DL600E Base Unit with AC power supply, 2 DTE ports
DL600E-AC-04	DL600E Base Unit with AC power supply, 4 DTE ports
DL600E-AC-02D	DL600E Base Unit with AC power supply, 2 DTE ports and E1 Drop and Insert
DL600E-AC-04D	DL600E Base Unit with AC power supply, 4 DTE ports and E1 Drop and Insert
DL600E-DC-02	DL600E Base Unit with DC power supply, 2 DTE ports
DL600E-DC-04	DL600E Base Unit with DC power supply, 4 DTE ports
DL600E-DC-02D	DL600E Base Unit with DC power supply, 2 DTE ports and E1 Drop and Insert
DL600E-DC-04D	DL600E Base Unit with DC power supply, 4 DTE ports and E1 Drop and Insert
DTE Cables	Cable to customer equipment
DL1300-10	V.35, DB25 male to M34 male, 10 ft.
DL1301-01	V.35, DB25 male to V.35 male, 1 ft.
DL1301-10	V.35, DB25 male to M34 male, 10 ft.
DL1303-10	RS449, DB25 male to DB37 male, 10 ft.
Network Cable	
DL1033-07	DB15 male to RJ48C (FCC), 7 ft.
Communications Cables	Cable to terminal
DL1081	DE9 to DE9, 2 connections
DL1082	DE9 to DE9, 4 connections
DL1083	DE9 to DE9, 8 connections

Appendix B

Connector and Pin Assignments

E1 Network Pin Assignments

The pin assignments for the DB15 network interface connector are listed in Table B-1 below.

Table B-1 Network Interface Pin Assignments

Pin	Signal
1	Send toward Network Tip (T1)
9	Send toward Network Ring (R1)
2	NC
3	Receive from Network Tip (T)
11	Receive from Network Ring (R)
4	NC
5, 6, 7, 8, 10, 12,13,14,15	NC

The AUX (E1) DTE Interface pin assignments for the 15-pin, female, sub-miniature-D connector with lock-posts are listed in Table B-2 below.

Table B-2 AUX (E1) DTE Connector Pin Assignments

Pin	Signal
1	Receive from Network Tip (T1)
9	Receive from Network Ring (R1)
2	Frame Ground
3	Send toward Network Tip (T)
11	Send toward Network Ring (R)
4	NC
5, 6, 7, 8, 10, 12,13,14,15	NC

DL600E-to-Equipment Pin Assignments

The pin assignments for DL600E unit to Equipment in Table B-3.

Table B-3 DL600E to Equipment Pin Assignments

Name	V.35	EIA-530	X.21	RS449	Description
Serial Clock Transmit	SCT -A, B (Y, AA)	SCT -A, B (Y, AA)		SCT -A, B (Y, AA)	Clock for SD. SD changes on positive transition of SCT (A) - SCT(B)
Serial Clock Receive	SCT -A, B (V, XX)	RT -A, B (17, 9)	Signal Element Timing (6, 13)	RT -A, B (8, 26)	Clock for RD. RD changes on positive transition of SCR(A) - SCR(B)
Receive Data	RD-A, B (R, T)	RD-A, B (3, 16)	Receive (4, 11)	RD -A, B (6, 24)	Received data from E1 network
Data Set Ready/Data Mode	DSR (E)	DCD RDY - A, B (6,22)		DM-A, B (11, 29)	See diagram for truth table
Receive Line Signal Detect	RLSD (F)	RS(8, 10)	Indication (5, 12)	RR-A, B (13, 31)	See diagram for truth table
Clear to Send	CTS (D)	CTS-A, B (5, 13)		CS-A, B (9, 27)	See diagram for truth table
Ring Indicator	RI (J)				Always inactive
Test Mode		TM (25)		TM (18)	See diagram for truth table

The pin assignments for Equipment to DL600E unit in Table B-4.

Table B-4 Equipment to DL600E Pin Assignments

Name	V.35	EIA-530	X.21	RS449	Description
Send Data	SD A, B (P,S)	T D-A, B (2, 14)	Transmit (2, 9)	SD A, B (4, 22)	Data stream from DTE to network
Data Terminal Ready	DTR (H)	DTE READY (20, 23)		RT A, B (12, 30)	Can be used to indicate loss of DTE signal.[a]
Request to Send	RTS (C)	RTS (4, 19)	Request To Send (3, 10)	RS A, B (7, 25)	Affects assertion of CTS and sending of Blue Alarm. See diagrams. See note 2.
Local Test/ Local Loop	LT (K)	LL (18)		LL (10)	When line is asserted by DTE, unit enters fractional DTE Loopback test and remains in test for as long as signal is held active.
Send Clk Transmit Echo	SCTE A, B (U, W)	TT-A, B (24, 11)		TT A, B (17, 35)	[b]
			Ground		
Signal Ground	SG(B)	SG(7)		SG(19)	
Frame Ground	A	1		1	Connected only at DTE side

ONE ≡ OFF ≡ MARK ≡ V(A) < VB)orV(A) < 0

ZERO ≡ ON ≡ SPACE ≡ V(A) > V(B)or > V(A) > 0

a. The data port can be programmed to recognize the Loss of DTE condition as either loss of RTS signal, loss of DTR signal or neither (the condition is never recognized). The hardware also supports the detection of all zero condition from the DTE which could be used to indicate a loss of DTE but currently not supported.

b. SCTE has two possible uses: a timing source to clock in the SD signal and an external timing source to be used as network transmit timing reference.

DB25-to-DC-37 (RS449) DTE Connector Pin Assignments

The pin assignments for the DB25-to-DC-37 (RS449) data port connector are listed below in Table B-5.

Table B-5 DB25 to DC-37 (RS449) DTE Connector Pin Assignments

DC-37 (RS449)	DB25	Signal Name	Signal
17	24	TT A	To DTE
35	11	TT B	To DTE
7	4	RS A	From DTE
25	19	RS B	From DTE
24	16	RD B	To DTE
6	3	RD A	To DTE
22	14	SD B	From DTE
4	2	SD A	From DTE
11	6	DM A	To DTE
29	22	DM B	To DTE
27	13	CS B	To DTE
9	5	DM A	To DTE
13	8	RR A	To DTE
31	10	RR B	To DTE
26	9	RT B	To DTE
8	17	RT A	To DTE
5	15	SCT A	To DTE
23	12	SCT B	To DTE
19	7	Signal Ground	
1	NC	Frame Ground	From DTE
18	25	TM	To DTE

DB25-to-M-34 (V.35) DCE Connector Pin Assignments

The pin assignments for the DB25 to V.35 DCE connector are listed below in Table B-6.

Table B-6 DB25 to V.35 DCE Connector Pin Assignments

Signal Name	M-34	DB25	Signal Name
Send Data	S	16	Receive Data
	P	3	
Receive Data	T	14	Send Data
	R	2	
DTR	H	6	DSR
DSR	E	20	DTR
RTS	C	8	RLSD
SCTE	W	9	SCR
	U	17	
SCR	V	24	SCTE
	X	11	
RLDS	F	4	RTS
GND	B	7	
	NC	1	

DB25-to-DC-37 (RS449) DCE Connector Pin Assignments

Table B-7 describes the DB25-to-DC-37 (RS449) DCE connector pin assignments.

Table B-7 DB25 to DC-37 (RS449) DCE Connector Pin Assignments

DC-37 (RS449)	DB25	Signal Name
8	24	A TT
26	11	B
13	4	A RTS
31	19	B
4	3	A RD
22	16	B
6	2	A SD
24	14	B
12	6	A DM
30	22	B
11	20	A TR
29	23	B
7	8	A RR
25	10	B
17	17	A RT
35	9	B
19	7	
NC	NC	
NC	1	

Communication Port Pin Assignments

Table B-8 describes the Comm Port pin assignments.

Table B-8 Communication Port Pin (DE9) Assignments

Pin	Signal	
1	DCD	Carrier Detect
2	SD	Send Data (from DL600E to terminal)
3	RD	Receive Data (from terminal to DSU)
4		No connection
5	SG	Signal Ground (bi-directional)
6		No connection
8		No connection
8[a]	CTS	Clear To Send (I/O to all DSUs only)
9		No connection

a. CTS is used by the DL600E unit as a collision avoidance line. This line should not be connected at the **CRT terminal end** of the Comm Port cable.

About the DCD Signal You can enable or disable the DCD signal. *Enabled*—When the DCD signal becomes inactive, this feature logs off any user trying to log on. Otherwise, when a modem carrier drops and a user is logged on, any other user can dial in and be logged on automatically.

When the modem carrier drops with a user logged on, the user is not logged out. The DL600E unit continuously frees the modem screen, repainting data and the modem does not answer dial in if receiving data.

Table B-9 lists the Comm Port parameter options.

Table B-9 Comm Port Parameter Options

Parameter	Options
Baud rate	1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400 (Default—9600)
Parity	Even, Odd and None (Default—None)
Word length	7 or 8 (Default—8)
Stop bits	1 or 2 (Default—2)

DE9-to-DB25 Adapter Pin Assignments

Digital Link provides a DB9-to-DB25 adapter for the Digital Link DE9 Comm Port ribbon cable. The pinout assignments for the adapters are listed below in Table B-10.

Table B-10 DE9-to-DB25 Adapter Pinouts

DB9	DB25
3	2
2	3
7	4
8	5
6	6
5	7
1	8
9s	23
4	21

DB25-to-DE9 Adapter Pin Assignments

Digital Link provides an adapter to accommodate the Digital Link DE9 Comm Port ribbon cable for the DB25 connector on the terminal port. The pin-out assignments are listed in Table B-11 below.

Table B-11 DB25-to-DE9 Adapter Pinouts

DB25	DE9
2	3
3	2
4	7
5	8
6	6
7	5
8	1
23	9
21	4

Glossary

A

All 1s — All Ones simulates the highest spectral components and highest energy out of the product and out of the line repeaters on the E1 line.

All 0s — A pattern that checks the correct operation of the HDB3 (E1) line coding. This code is meant to allow a pattern with many 0 bits to go through the line transparently.

attenuation — Reduction or loss of signal strength, measured in decibels; opposite of gain.

B

bandwidth — The data-carrying capacity of a transmission medium, usually measured in Hertz (Hz), which equals cycles per second.

bipolar — The predominant signaling method used for digital transmission services, such as DDS and T1, in which the signal carrying the binary value successively alternates between positive and negative polarities. Zero and one values are represented by the signal amplitude at either polarity, while no value “spaces” are at zero amplitude.

bit error — Occurs when the value of an encoded bit is changed in transmission, and interpreted incorrectly by the receiver.

broadband — Services or interfaces that operate above the T1 data rate, typically at NxT1, T3, SONET, or ATM speeds.

C

central office (CO) — The phone company switching facility or center; usually a Class 5 end office, at which subscribers' local loops terminate.

channel — A physical or logical path allowing the transmission of information; the path connecting a data source and receiver.

circuit — Generally referring to a transmission medium connecting two or more electronic devices.

clear channel — A characteristic of a transmission path or digital circuit in which the full bandwidth is available to the user. The phone company does not use any portion of the bandwidth for framing or control bits.

clock — An oscillator-generated signal providing a timing reference for a transmission link; used to control timing functions such as sampling interval, signaling rate and duration of signal elements.

code conversion — The process of changing the bit grouping for a character in one code into the corresponding bit grouping for the character in another.

Code Violation (CV) — A code violation occurs when the ones bit is not represented with the opposite signal of the previous ones bit.

communications port (Comm Port) — The electrical interface between a unit and the operator's terminal. Operator commands and responses can be communicated through the Comm Port.

connector — A physical interface, such as DA15 or RS232-C, typically with male or female components.

CPE (Customer Premises Equipment) — Equipment that interfaces the telephone network and physically resides at the user's location.

CRC (Cyclic Redundancy Check) — A link-level error checking feature used when additional protection is needed against simulation of the frame alignment signal and/or when an enhanced error monitoring capability is needed. A CRC calculation is performed and four frame bits are used to store it over the content of the frame. The CRC calculation is performed again when the frame is received and the CRC values are compared. If they do not match, the frame is considered bad and the CRC statistic is incremented.

CSU (Channel Service Unit) — The CPE used to terminate a digital circuit at the customer site. It performs certain line-conditioning functions, ensures network compliance to FCC rules and responds to loopback commands. It ensures proper ones density in the bit stream and performs bipolar violation correction. A DSU and CSU are often in the same unit, called a DSU/CSU.

CTS (Clear to Send) — A signal issued by the DSU to indicate it is connected to the digital network and is ready to accept data.

CV (Code Violation) — Occurs when the ones bit is not represented with the opposite signal of the previous ones bit.

D

data link — A serial data communication transmission path, generally between two adjacent nodes or devices and without intermediate switching nodes.

data link layer — In the OSI model, the network processing entity that establishes, maintains and releases data link connections between adjacent elements in the network.

DCE (Data Circuit-Terminating Equipment) — Equipment that is either a part of the network, an access point to the network, a network node, or equipment at which a network circuit terminates.

dial-up — Describing the process of, or the equipment or facilities involved in, establishing a temporary connection via the switched telephone network.

digital — Referring to communications procedures, techniques and equipment where information is encoded as either a binary *1* or *0*.

digital loopback — A technique for testing the digital processing circuitry of a communications device; may be initiated locally or remotely via a telecommunications circuit. The device being tested returns a received test message, the results of which are compared to the original message.

DS0 (Digital Signal Level 0) — A 64kbit/s standard digital telecommunications signal or channel.

DS1 (Digital Signal Level 1) — The 1.544Mbps digital signal carried on a T1 facility.

DS3 (Digital Signal Level 3) — The 44.736Mbps digital signal carried on a T3 facility.

DS4 (Digital Signal Level 4) — The 274.176Mbps digital signal carried on a T4 facility.

DSU (Data Service Unit) — Also called a Digital Service Unit. A device designed to connect a DTE to a digital phone line. The DSU transmits and receives the signal and provides buffering and flow control. A DSU and CSU are often in the same unit, called a DSU/CSU.

DSU/CSU (Data Service Unit/Channel Service Units) — The pair of communications devices (DSU and CSU) that connect an in-house line to an external digital circuit. At the customer's end of the telephone connection, the DSU/CSU takes data from terminals and computers, encodes it, and transmits it down the link. At the receive end, another DSU/CSU equalizes the received signal, filters it, and decodes it for interpretation by the end-user.

DSR (Data Set Ready) — A data port signal.

DSU Loopback — A DSU loopback is intended to include as much of the customer data communications circuitry in the looped-back path as possible. The signal passes from the remote unit into the local unit as far as the DSU. This test loops the received network signal back to the network.

DSX-1 (Digital Signal Cross Connect Level 1) — Parameters set used when DS1 signals are cross connected.

DTE (Data Terminal Equipment) — Terminal equipment connected to the DSU and used for communication over digital networks. May be a terminal, computer, printer or multiplexer.

DTE loopback — An EIA232-D signal which indicates that the DTE is ready for operation.

DTR (Data Terminal Ready) — Signal from DTE to DSU/CSU.

E

E1 — European counterpart to T1, which transmits at 2.048 Mbps. 30 channels.

E2 — European counterpart to T2, which transmits at 8.448 Mbps. 120 channels.

E3 — European counterpart to T3, which transmits at 34.368 Mbps. 480 channels.

E4 — European counterpart to T4, which transmits at 139.264 Mbps. 1920 channels.

EER (Excessive Error Rate) — Determined by counting the number of T1/T3 code violations during a time interval.

EFS (Error Free Seconds) — Occurs when a second is free of CRC-6 violations or Out of Frame (OOF) events or one or more BPV or OOF events.

EIA (Electronic Industries Association) — An organization which sets data communication industry standards.

EIA 530 — Electrical standard and interface.

encoding/decoding — The process of reformatting information into a format suitable for transmission, and then recovering it after transmission.

equalization — The spacing and operation of amplifiers so that the gain provided by the amplifier, per transmission frequency, coincides with the signal loss at the same frequency; circuitry that compensates for the differences in attenuation at different frequencies.

F

far end — The unit or units remote from the user.

FE (Framing Errors) — Occurs when the end of a frame is not detected where it should be.

FG (Frame Ground) — A signal from DTE to DSU/CSU.

fractional bandwidth DTE loopback — A loopback test that loops back the signal at the network interface. See also l*oopback.*

Fractional T1 — A service that provides less than full T1 capacity (one or more 64 Kbps channels are provided).

frame — A group of bits sent serially over a communications channel. The basic data transmission unit employed with bit oriented protocols.

Framing Error Event — An invalid frame identified by the Frame Check Sum (FCS).

frame relay — A high-speed packet switching protocol used for wide area networks (WANs); faster than traditional X.25 networks because it is designed for today's reliable circuits and performs less rigorous error detection. Frame relay networks use bandwidth only when there is traffic to send. They do not support voice.

framing — A technique which separates incoming bits into identifiable groups to enable the receiving device to recognize and reconstruct them.

frame ground shield — A metallic layer acting as a shield, consisting of tape, braid, wire or sheath and surrounding insulated conductors in a cable. The frame ground shield may be the cable’s metallic sheath or the metallic layer inside a nonmetallic sheath. It reduces stray electrical fields, prevents outside electrical interference, drains off current induced by lightning and provides for safety of personnel.

frequency — The number of repetitions per unit time of a complete waveform. The number of complete cycles per unit of time, usually expressed in Hz.

full bandwidth DTE loopback — A loopback test that loops back the signal at the multiplexer. See also *loopback*.

H

HDB3 (High Density Bipolar 3) — A bipolar coding method that does not allow more than 3 consecutive zeroes. A T1 carrier standard, like D4, ESF.

I

impedance —Resistance to the flow of alternating current in a circuit. A DSU/CSU is used to amplify and match impedance or match/balance network signaling to the customer's equipment

IP address —A unique, 32-bit identifier for a TCP/IP host on a network. IP addresses are normally printed in dotted decimal form, such as

L

LED (Light emitting diode) — A device that accepts electrical signals and converts the energy to a light signal.

loopback — A diagnostic test in which the transmitted signal is returned to the sending device after passing through a data communications link or network. This allows a technician (or built-in diagnostic circuit) to compare the returned signal with the transmitted signal and get some sense of what's wrong.

LOS (Loss of Signal) — Occurs when an input signal is detected as all zeros for 176 bit times.

loss —A reduction in signal strength, expressed in decibels.

LT (Local Test) — A data port signal to DSU/CSU.

M

mask —Refer to subnet mask.

MIB (Management Information Base) — A structure that defines what is obtainable from a network device and what can be controlled. The MIB provides a directory listing the logical names of all information resources residing in the network and pertinent to the network's management. It is used to describe network management variables.

MTBF (Mean Time between Failure) — The average time a manufacturer estimates before a failure occurs in a component, a printed circuit board or a complete telephone **system.**

multidrop — A communications arrangement where multiple devices share a common transmission channel, though only one may transmit at a time.

N

NI (Network Interface) — The point of demarcation between the customer premises and the carrier's network, usually drawn at the network connector on the rear panel of the Digital Link access device.

P

parity bit — An additional, non-informational bit appended to a group of bits indicating that the number of “ones” in the bits group is odd or even.

parity check — A process of error checking using the parity bit.

plug — A male connector designed to fit into a particular socket.

polarity — Any condition where there are two opposing charges, such as positive and negative.

port — The physical point of access into a computer, network or other electronic device.

protocol — A formal set of rules governing the format, timing, sequencing and error control of exchanged messages on a data network.

Q

QRW is a pseudo random signal which may catch problems not exposed by other test patterns. The DSU/CSU transmits a QRW pattern to the E1 network, the remote system loops it back to the DSU/CSU which monitors the signal for QRW bit errors.

R

RAI (Received Alarm Indication) — An RAI occurs when one end detects a loss of frame alignment condition and sends a remote end alarm signal bit to the other end.

RD (Receive Data) — A data port signal.

receiver — The receiver synchronizes the framing pattern, separates the frame bits from the payload data and monitors for frame errors in 64K mode. It achieves frame synchronization within 5msec (ANSI T1.410-1992 Section 8.2).

repeater — Equipment that receives a pulse train, amplifies it, retimes it, and then reconstructs the signal for retransmission.

return to zero — Method of transmitting binary information such that, after each encode bit, voltage returns to the zero level.

RI (Ring Indicator) — A data port signal.

RJ48S — An 8-position keyed jack used to connect services that are covered under FCC Part 68 Rules, such as public switched digital service (PSDS), switched 56, 19.2 Kbps service, 64 Kbps service, and synchronous digital data with secondary channel.

RLSD — Receive Line Signal Detect, a data port signal

RS232 — A TIA/EIA standard for serial transmission between computers and peripheral devices (modem, mouse, an so on.). It uses a 25-pin DB25 or 9-pin DC9 connector. Its normal cable limitation of 50 feet can be extended to several hundred feet with high-quality cable. RS232 defines the purpose and signal timing for each of the 25 lines; however, many applications use less than a dozen. RS232 transmits positive voltage for a 0 bit, negative voltage for a 1.

RS232-C — An EIA specified physical interface, with associated electrical signaling, between data circuit terminating equipment (DCE) and data terminating equipment (DTE).

RS449 — A common 37-position interface for data terminal equipment and data circuit terminating equipment employing serial binary data interchange. A balanced interface, based on unipolar digital signals, depending more on current flow than voltage, therefore supports greater distances RS232.

RTS (Request to Send) — A signal sent by DTE to DSU/CSU indicating DTE has data ready to transmit.

S

SCR (Serial Clock Receive) — A unipolar clock from the DCE signal. A data port signal.

SCT (Serial Clock Transmit) — A unipolar clock from the DCE signal. A data port signal.

SCTE (Serial Clock Transmit External) — The clock signal is echoed from the DTE for the purpose of timing incoming data on long cable runs.

scrambler — A device or software program that encodes data for encryption. It distorts a voice or data conversation so that only another like device can figure out the content of the message.

SD (Send Data) — A signal from DTE to DSU/CSU.

secondary channel — A subchannel derived from the main channel. It does not carry data messages and is used for diagnostic or supervisory purposes.

serial interface — Data channel that transfers digital data in a serial fashion: one bit after the other. Communications lines are generally serial, thus modems are connected to the computer via a serial port. So are mice and scanners. Serial interfaces have multiple lines, but only one is used for data. Contrast with parallel interface. See RS232.

serial port — I/O connector used to attach a modem, mouse, scanner or other serial interface device to the computer. The typical serial port uses a DB25 or DC9 connector, which on the back of a PC is a 25-pin male or 9-pin male connector. Contrast with parallel port. See RS232.

serial transmission — A sequential transmission of bits constituting an entity of data over a data circuit.

SG (Signal Ground) — A signal from DTE to DSU/CSU.

simplex current — One way transmission used by Telco to provide power to repeaters.

SLIP (Serial Line IP) — A TCP/IP protocol that allows IP packets to be transmitted over a serial link, such as a dial-up or private telephone line.

SMDS (Switched Multimegabit Data Service) — A fast-packet technology based on the connection-less data networking capability described in the IEEE 802.6 specification. The data format for SMDS is “cell oriented.” SMDS does not support voice.

smooth clock — A clock that eliminates gaps created during frame bit removal.

SNMP (Simple Network Management Protocol) — A widely-used network monitoring and control protocol. Data is passed from SNMP agents (hardware and/or software processes reporting activity in each network device — hub, router, bridge, an so on.) to the workstation console used to oversee the network. The agents return information contained in a MIB (Management Information Base), which is a structure that defines what is obtainable from the device and what can be controlled.

socket — A female connector designed to receive a male connector or plug.

stop bit — The last transmitted element in each character, which permits the receiver to come to an idle condition before accepting another character.

synchronous transmission — The transmission of data in which both stations are synchronized. Codes are sent from the transmitting station to the receiving station to establish the synchronization, and data is then transmitted in continuous streams.

subnet mask — The number of bits in an IP address used for the subnet address.

T

T1 — A digital carrier facility used to transmit a DS1 formatted digital signal at 1.544 Mbps. T1 normally can handle 24 voice conversations, each one digitized at 64kbps. But, with more advanced digital voice encoding techniques, it can handle more voice channels. T1 is a standard for digital transmission in North America. T1 lines are used for connecting networks across remote distances.

T3 — A digital carrier facility used to transmit a DS3 formatted digital signal at 44.736 Mbps.

T-Carrier — A time-division, multiplexed digital transmission facility, usually operating at an aggregate data rate of 1.544 Mbit/s.

TIA — Telecommunications Industry Association. A Washington lobbying and trade association, the result of the merger in 1988 of the USTA (United States Telephone Association) and the EIA (Electronic Industries Association). TIA sets telecommunications standards worldwide for physical level interfaces (RS232, RS422, an so on.).

telnet — A remote terminal application that enables the user to log on to a remote computer on the same IP network. The user can work from the PC as if it were a terminal attached by a hard-wired line to the remote computer. The application uses the *Telnet* Internet protocol.

transmitter — In 64K mode, the transmitter inserts the frame bit, with a fixed pattern of 101100.

TRAP — A mechanism by which a device automatically sends an alarm for certain network events to a management station. The management station can initiate a polling sequence to the device to determine the cause of the problem.

U

UA1 (Unframed All 1s) — When the DSU loses its signal from the DTE device, it generates a *NET UA1 Received Alarm* to the E1 network.

V

V.35 — A CCITT standard for the trunk interface between a network access device and a packet network. It defines signaling for data rates greater than 19.2 Kbps.

V.52 — Terminal emulation standard. CCITT standard (1976) for various loopback tests that can be incorporated into modems for testing the telephone circuit and isolating transmission problems. Operating modes include local and remote digital loopback and local and remote analog loopback.

V.54 — A CCITT standard for loop test devices in modems. It defines local and remote loopbacks.

X

X.21 — An interface between data terminal equipment (DTE) and data circuit-equipment (DCE) for synchronous operation on public data networks. Also, a CCITT standard protocol for a circuit switching network.

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Y

Yellow Alarm
Menu-4 Main Configuration 3-10